

L INTERPRETER

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## R0001 SECTION 1 DISPATCHER

R0002 ENTRY TO THE INTERPRETER. INTPRET SETS LOC TO THE FIRST INSTRUCTION, BANKSET TO THE BBANK OF THE  
 R0004 OBJECT INTERPRETIVE PROGRAM, AND INTBIT15 TO THE BIT15 CONTENTS OF FBANK. INTERPRETIVE PROGRAMS MAY BE IN  
 R0006 VIRTUALLY ALL BANKS PRESENT UNDER ANY SUPER-BANK SETTING, WITH THE RESTRICTION THAT PROGRAMS IN HIGH BANKS  
 R0008 (BIT15 OF FBANK = 1) DO NOT REFER TO LOW BANKS, AND VICE-VERSA. THE INTERPRETER DOES NOT SWITCH SUPERBANKS.  
 R0010 E-BANK SWITCHING OCCURS WHENEVER GENERAL ERASABLE (100 - 3777) IS ADDRESSED.

0012 6006 BLOCK 03

				COUNT 03/INTER		
0013	REF 1	6006	0 0003 1	INTPRET	RELINT	
0014		6007	0 0006 1		EXTEND	
0015	REF 7 LAST 1075	6010	22 184 1		QXCH LOC	SET LOC TO THE WORD FOLLOWING THE TC.
0016	REF 15 LAST 1075	6011	3 0006 1	+2	CA BBANK	INTERPRETIVE BRANCHES FINISH HERE.
0017	REF 2 LAST 1075	6012	54 185 1		TS BANKSET	
0018	REF 43 LAST 987	6013	7 4874 1		MASK BIT15	GET 15TH BIT FOR INDEXABLE ADDRESSES.
0019	REF 5 LAST 67	6014	54 115 0		TS INTBIT15	
0020	REF 8 LAST 1075	6015	54 023 1		TS EDOP	MAKE SURE NO INSTRUCTIONS LEFT OVER
0021	REF 1	6016	1 6037 1		TCP NEWOPS	
0022	REF 16 LAST 1077	6017	22 006 1	INTRSM	LXCH BRANK	
0023	REF 226 LAST 891	6020	1 6011 0		TCP INTPRET +3	RESUME SUSPENDED INTERPRETIVE JOB
0024	DLOAD LOADS MPAC, MPAC +1, LEAVING ZERO IN MPAC +2.					
0025	REF 1	6021	0 0006 1	DLOAD	EXTEND	
0026		6022	5 0116 1		INDEX ADDRWD	
0027		6023	3 0001 0		DCA 0	LOAD DP C(C(ADDRWD)) INTO MPAC, MPAC +1
0028	REF 289 LAST 891	6024	52 155 1	SLOAD2	DXCH MPAC	
0029	REF 209 LAST 1071	6025	3 4714 1		CAP ZERO	ZERO MPAC +2

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P0030 AT THE END OF MOST INSTRUCTIONS, CONTROL IS GIVEN TO DANZIG TO DISPATCH THE NEXT OPERATION.

0032	REP 290	LAST 1077	6026 54 156 1	TS	MPAC +2	AND DECLARE DP MODE
0033	REP 4	LAST 533	6027 54 163 1	NEWMODE	TS	MODE
0034	REP 3	LAST 1077	6030 3 0165 0	DANZIG	CA	BANKSET
0035	REP 17	LAST 1077	6031 54 006 0	TS	BANK	BANK
0036	REP 9	LAST 1077	6032 10 023 1	NOIBNKS	CCS	EDOP
0037	REP 1		6033 1 6046 1	TCP	OPJUMP	
A0038						SEE IF AN ORDER CODE IS LEFT OVER FROM THE LAST PAIR RETRIEVED. IF SO, EXECUTE. EDOP IS SET TO ZERO ON ITS RE-EDITING.
0039	REP 5	LAST 828	6034 10 067 1	CCS	NEWJOB	
0040	REP 1		6035 1 5063 0	TCP	CHANG2	SEE IF A JOB OF HIGHER PRIORITY IS PRESENT, AND IF SO, CHANGE JOBS.
0041	REP 8	LAST 1077	6036 24 164 1	INCR	LOC	
R0042		ITRACE (1) REFERS TO ANEWOPS.				ADVANCE THE LOCATION COUNTER.
0043	REP 9	LAST 1078	6037 50 164 1	NEWOPS	INDEX	LOC
0044			6040 3 0000 1	CA	0	
0045	REP 276	LAST 1073	6041 10 000 0	CCS	A	
0046	REP 1		6042 1 6331 1	TOP	DOSTORE	TEST SIGN AND GET DABS(A). PROCESS STORE CODE.
0047			6043 00177 0	LOW7	OCT	177
0048	REP 10	LAST 1078	6044 54 023 1	TS	EDOP	
0049	REP 6	LAST 365	6045 7 6043 1	MASK	LOW7	OP CODE PAIR. LEAVE THE OTHER IN EDOP WHERE CCS EDOP WILL HONOR IT NEXT.
0050	REP 13	LAST 372	6046 54 020 1	OPJUMP	TS	CYR
0051	REP 14	LAST 1078	6047 10 020 1	CCS	CYR	
0052	REP 1		6050 1 6216 0	TOP	OPJUMP2	LOW7 ENTERS HERE IF A RIGHT-HAND OP CODE IS TO BE PROCESSED. TEST PREFIXES. TEST SECOND PREFIX BIT.
0053	REP 1		6051 1 6712 1	TCP	EXIT	+0 OP CODE IS EXIT.

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P0054 PROCESS ADDRESSES WHICH MAY BE DIRECT, INDEXED, OR REFERENCE THE PUSHDOWN LIST.

0056	REF	74	LAST	1059	6052	7 4712 0	ADDRESS	MASK	BIT1	SEE IF ADDRESS IS INDEXED. CYR CONTAINED 4000X, SO BIT 1 IS NOW AS IT WAS IN CYR.
0057	REF	277	LAST	1078	6053	10 000 0	CCS	A		FORM INDEXED ADDRESS.
0058	REF	1			6054	1 6115 0	TCP	INDEX		
0059	REF	10	LAST	1076	6055	50 164 1	DIRADRES	INDEX	LOC	LOOK AHEAD TO NEXT WORD TO SEE IF ADDRESS IS GIVEN.
0060					6056	4 0001 1	OCT40001	CS	1	
0061	REF	278	LAST	1079	6057	10 000 0	CCS	A		
0062	REF	1			6060	1 6164 0	TCP	PUSHUP		IF NOT.
0063					6061	77773 1	NEG4	DEC	-4	
0064	REF	11	LAST	1079	6062	24 184 1	INCR	LOC		IF SO, TO SHOW WE PICKED UP A WORD.
0065	REF	2	LAST	1077	6063	54 116 0	TS	ADDRWD		

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P0066 FINAL DIGESTION OF DIRECT ADDRESSES OF OP CODES WITH 01 PREFIX IS DONE HERE. IN EACH CASE, THE  
 R0066 REQUIRED 12-BIT SUB-ADDRESS IS LEFT IN ADDRWD, WITH ANY REQUIRED E OR F BANK SWITCHING DONE. ADDRESSES LESS  
 R0070 THAN 45D ARE TAKEN TO BE RELATIVE TO THE WORK AREA. THE OP CODE IS NOW IN BITS 1-5 OF CYR WITH BIT 14 = 1.  
 0072 REP 1 6064 6 6220 1 AD -ENDVAC SEE IF ADDRESS RELATIVE TO WORK AREA.  
 0073 REP 279 LAST 1079 6065 10 000 0 CCS A  
 0074 REP 1 6066 6 7712 1 AD -ENDERAS IF NOT, SEE IF IN GENERAL ERASABLE.  
 0075 REP 1 6067 1 6074 0 TCP IERASTST  
 0076 REP 18 LAST 840 6070 3 0120 1 NETZERO CA FIXLOC  
 0077 REP 3 LAST 1079 6071 26 116 0 ADS ADDRWD  
 0078 REP 15 LAST 1078 6072 50 020 0 ITR15 INDEX CYR  
 0079 REP 1 6073 7 6242 1 7 INDJUMP -1 IF SO, LEAVE THE MODIFIED ADDRESS IN  
 ADDRWD AND DISPATCH.  
 THIS INDEX MAKES THE NEXT INSTRUCTION  
 TCP INDJUMP + OP, EDITING CYR.  
 0080 REP 1 6074 0 0006 1 IERASTST EXTEND  
 0081 REP 1 6075 6 6105 0 B2MF GEADDR GO PROCESS GENERAL-ERASABLE ADDRESS.  
 0082 REP 13 LAST 1075 6076 7 4747 0 MASK LOW10  
 0083 REP 14 LAST 1080 6077 6 4747 1 AD LOW10  
 0084 REP 4 LAST 1080 6100 56 116 1 XCH ADDRWD  
 0085 REP 6 LAST 1077 6101 6 0115 1 AD INTBIT15  
 0086 REP 11 LAST 1075 6102 54 004 1 TS FBANK  
 0087 REP 16 LAST 1080 6103 50 020 0 ITR12 INDEX CYR  
 0088 REP 2 LAST 1080 6104 7 6242 1 7 INDJUMP -1  
 0089 REP 8 LAST 1071 6105 7 4373 0 GEADDR MASK LOW8  
 0090 REP 3 LAST 372 6106 6 4744 1 AD OCT1400  
 0091 REP 5 LAST 1080 6107 56 116 1 XCH ADDRWD  
 0092 REP 46 LAST 1071 6110 54 003 0 TS EBANK  
 0093 REP 17 LAST 1080 6111 50 020 0 ITR10 INDEX CYR  
 0094 REP 3 LAST 1080 6112 7 6242 1 7 INDJUMP -1

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P0095 THE FOLLOWING ROUTINE PROCESSES INTERPRETIVE INDEXED ADDRESSES. AN INTERPRETER INDEX REGISTER MAY  
 R0097 CONTAIN THE ADDRESS OF ANY ERASABLE REGISTER (0-42 BEING RELATIVE TO THE VAC AREA) OR ANY INTERPRETIVE PROGRAM  
 R0099 BANK, OR ANY INTEGER IN THAT RANGE.

0100	REP 1	6113 3 7702 0	DODLOAD* CAP	DLOAD* CYR	STOVL* COMES HERE TO PROCESS LOAD ADR. (STOVL* ENTERS HERE).
0101	REP 16 LAST 1080	6114 54 020 1		TS	
0102	REP 19 LAST 1060	6115 3 0120 1	INDEX	CA FIXLOC	SET UP INDEX LOCATION.
0103	REP 1	6116 54 130 1		TS INDEXLOC	
0104	REP 12 LAST 1079	6117 24 184 1		INCR LOC	
0105	REP 13 LAST 1081	6120 50 184 1		INDEX LOC	(ADDRESS ALWAYS GIVEN).
0106		6121 4 0000 0		CS 0	
0107	REP 280 LAST 1080	6122 10 000 0		CCS A	
0108	REP 2 LAST 1081	6123 24 130 0		INCR INDEXLOC	INDEX 2 IP ADDRESS STORED COMPLEMENTED.
0109		6124 16 125 0		NOOP	
0110	REP 6 LAST 1080	6125 54 116 0		TS ADDRWD	14 B1T ADDRESS TO ADDRWD.
0111	REP 2 LAST 129	6126 7 7711 0		MASK HIGH4	IF ADDRESS GREATER THAN 2K, ADD INTBIT15
0112		6127 0 0008 1		EXTEND	
0113	REP 1	6130 1 6133 1		B2P INDEX2	
0114	REP 7 LAST 1080	6131 3 0115 1		CA INTBIT15	
0115	REP 7 LAST 1081	6132 26 116 0		ADS ADDRWD	
0116	REP 3 LAST 1081	6133 50 130 0	INDEX2	INDEX INDEXLOC	
0117	REP 46 LAST 662	6134 4 0046 1		CS X1	
0118	REP 6 LAST 1081	6135 26 116 0		ADS ADDRWD	DO AUGMENT, IGNORING AND CORRECTING OVF.
0119	REP 5 LAST 737	6136 7 7713 1		MASK HIGH9	SEE IP ADDRESS IS IN WORK AREA.
0120		6137 0 0006 1		EXTEND	
0121	REP 1	6140 1 6153 1		B2P INDWORK	
0122	REP 3 LAST 1081	6141 7 7711 0		MASK HIGH4	SEE IF IN FIXED BANK.
0123		6142 0 0006 1		EXTEND	
0124	REP 1	6143 1 6155 1		B2P INDERASE	
0125	REP 9 LAST 1081	6144 3 0116 1		CA ADDRWD	IN FIXED - SWITCH BANKS AND CREATE SUB-ADDRESS.
0126	REP 12 LAST 1080	6145 54 004 1		TS FBANK	
0127	REP 15 LAST 1060	6146 7 4747 0		MASK LOW10	
0128	REP 1	6147 6 4700 1		AD 2K	
0129	REP 10 LAST 1081	6150 54 118 0		TS ADDRWD	
0130	REP 19 LAST 1081	6151 50 020 0	1TR11	INDEX CYR	
0131	REP 4 LAST 1080	6152 3 8242 0		3 INDJUMP -1	
0132	REP 20 LAST 1081	6153 3 0120 1	INDWORK	CA FIXLOC	MAKE ADDRWD RELATIVE TO WORK AREA.
0133	REP 1	6154 1 6181 0		TCF 1TR13 -1	
0134	REP 4 LAST 1080	6155 3 4744 1	INDERASE	CA OCT1400	
0135	REP 11 LAST 1081	6158 56 116 1		XCH ADDRWD	
0136	REP 47 LAST 1080	6157 54 003 0		TS FBANK	
0137	REP 9 LAST 1080	6160 7 4373 0		MASK LOW8	
0138	REP 12 LAST 1081	6161 28 116 0	-1	ADS ADDRWD	

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0139	REF	20	LAST	1081	6162	50 020 0	ITR13	INDEX	CYR
0140	REF	5	LAST	1081	6163	3 6242 0		3	INDJMP -1

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R0141 PUSH-UP ROUTINES. WHEN NO OPERAND ADDRESS IS GIVEN, THE APPROPRIATE OPERAND IS TAKEN FROM THE PUSH-DOWN LIST. IN MOST CASES THE MODE OF THE RESULT (VECTOR OR SCALAR) OF THE LAST ARITHMETIC OPERATION PERFORMED R0145 IS THE SAME AS THE TYPE OF OPERAND DESIRED (ALL ADD/SUBTRACT ETC.). EXCEPTIONS TO THIS GENERAL RULE ARE LISTED R0147 BELOW (NOTE THAT IN EVERY CASE THE MODE REGISTER IS LEFT INTACT).

R0148 1. VXSC AND V/SC WANT THE OPPOSITE TYPE OF OPERAND, E.G., IF THE LAST OPERATION YIELDED A VECTOR R0150 RESULT, VXSC WANTS A SCALAR.

R0151 2. THE LOAD CODES SHOULD LOAD THE ACCUMULATOR INDEPENDENT OF THE RESULT OF THE LAST OPERATION. THIS R0153 INCLUDES VLOAD, DLOAD, TLOAD, PDL, AND PDVL (NO PUSHUP WITH SLOAD).

R0154 3. SOME ARITHMETIC OPERATIONS REQUIRE A STANDARD TYPE OF OPERAND REGARDLESS OF THE PREVIOUS OPERATION. R0156 THIS INCLUDES SIGN WANTING DP AND TAD REQUIRING TP.

0157	NSP	1	6164	3 4374 0	PUSHUP	CAP	OCT23	IF THE LOW 5 BITS OF CYR ARE LESS THAN
0158	NSP	21	LAST 1062	6165	7 0020 1	MASK	CYR	20, THIS OP REQUIRES SPECIAL ATTENTION.
0159	NSP	1		6166	6 6171 0	AD	-OCT10	(NO -0).
0160	NSP	281	LAST 1081	6167	10 000 0	CCS	A	
0161	NSP	1		6170	1 6202 0	TCF	REGUP	FOR ALL CODES GREATER THAN OCT 7.
0162				6171	77767 1	-OCT10	OCT	-10
0163	NSP	2	LAST 1020	6172	6 6061 0	AD	NEG4	WE NOW HAVE 7 - OP CODE(MOD4). SEE IF
0164	NSP	282	LAST 1083	6173	10 000 0	CCS	A	THE OP CODE (MOD4) IS THREE (REVERSE).
0165	NSP	283	LAST 1083	6174	50 000 1	INDEX	A	NO - THE MODE IS DEFINITE. PICK UP THE
0166	NSP	1		6175	4 6213 0	CS	NO.WDS	
0167	NSP	2	LAST 1063	6176	1 6204 0	TCF	REGUP +2	
0168	NSP	5	LAST 1076	6177	50 163 0	INDEX	MODE	FOR VXSC AND V/SC WE WANT THE REQUIRED
0169	NSP	1		6200	4 6211 1	CS	REVCNT	PUSHLOC DECREMENT WITHOUT CHANGING THE
0170	NSP	3	LAST 1063	6201	1 6204 0	TCF	REGUP +2	MODE AT THIS TIME.
0171	NSP	6	LAST 1083	6202	50 163 0	REGUP	INDEX	MOST ALL OP CODES PUSHUP HERE.
0172	NSP	2	LAST 1063	6203	4 6213 0	CS	NO.WDS	
0173	NSP	1		6204	28 166 1	+2	ADS	PUSHLOC
0174	NSP	13	LAST 1081	6205	54 116 0		TS	ADDRMD
0175	NSP	22	LAST 1063	6206	50 020 0	ITR14	INDEX	
0176	NSP	6	LAST 1062	6207	7 6242 1	7	INDJUMP	(THE INDEX MAKES THIS A TCF.)
0177				6210	00002 0	OCT	2	REVERSE PUSHUP DECREMENT. VECTOR TAKES 2
0178				6211	00006 1	REVCNT	6	WORDS, SCALAR TAKES 6.
0179				6212	00006 1	OCT	6	
0180				6213	00002 0	NO.WDS	OCT	CONVENTIONAL DECREMENT IS 6 WORDS VECTOR
0181				6214	00003 1	OCTAL3	OCT	2 IN DP, AND 3 IN TP.
0182				6215	00006 1	OCT	6	

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P0183 TEST THE SECOND PREFIX BIT TO SEE IF THIS IS A MISCELLANEOUS OR A UNARY/SHORT SHIFT OPERATION.

0185 REF 23 LAST 1083 6216 10 020 1 OPJUMP2 CCS CYR TEST SECOND PREFIX BIT.  
0186 REF 1 6217 1 0232 0 TCF OPJUMP3 TEST THIRD BIT TO SEE IF UNARY OR SHIFT.  
0187 6220 77722 0 -ENDVAC DEC -45

R0188 THE FOLLOWING ROUTINE PROCESSES ADDRESSES OF SUPPIX CLASS 10. THEY ARE BASICALLY WORK AREA ADDRESSES  
R0190 IN THE RANGE 0 - 52, ERASABLE ECADR CONSTANTS FROM 100 - 3777, AND FCADRS ABOVE THAT. ALL 15 BITS ARE AVAILABLE  
R0192 IN CONTRAST TO SUPPIX 1, IN WHICH ONLY THE LOW ORDER 14 ARE AVAILABLE.

0193	REF 14 LAST 1081	6221 24 184 1	15BITADR INCR	LOC	(ENTRY HERE FROM STCALL).
0194	REF 15 LAST 1084	6222 50 164 1	INDEX	LOC	PICK UP ADDRESS WORD.
0195		6223 3 0000 1	CA	0	
0196	REF 5 LAST 67	6224 54 117 1	TS	POLISH	WE MAY NEED A SUBADDRESS LATER.
0197	REF 1	6225 3 4750 1	CAP	LOW7+2K	THESE INSTRUCTIONS ARE IN BANK 1.
0198	REF 13 LAST 1081	6228 54 004 1	TS	FBANK	
0199	REF 24 LAST 1084	8227 7 0020 1	MASK	CYR	
0200	REF 284 LAST 1083	6230 50 000 1	ITR7	INDEX A	
0201	REF 1	6231 1 6303 0	TCF	MISJCMP	

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P0202 COMPLETE THE DISPATCHING OF UNARY AND SHORT SHIFT OPERATIONS.

0203	REP	14	LAST 1084	6232 54 004 1	OPJUMP3	TS	FBANK	CALL IN BANK 0 (BITS 11-15 OF A ARE 0.)
0204	ITRACE (6) REFERS TO BOPJUMP3A.							
0205	REP	25	LAST 1084	6233 10 020 1	CCS	CYR	TEST THIRD PREFIX BIT.	
0206	REP	285	LAST 1084	6234 50 000 1	INDEX	A	THE DECREMENTED UNARY CODE IS IN BITS	
0207	REP	1		6235 1 2000 1	TOP	UNAJUMP	1-4 OF A (ZERO, EXIT, HAS BEEN DETECTED)	
0208	REP	1	LAST 1083	6236 10 163 1	CCS	MODE	ITS A SHORT SHIFT CODE. SEE IF PRESENT	
0209	REP	1		6237 1 2017 1	TOP	SHORTT	SCALAR OR VECTOR.	
0210	REP	2	LAST 1085	6240 1 2017 1	TOP	SHORTT	CALLS THE APPROPRIATE ROUTINE.	
0211	REP	1		6241 1 2121 0	TOP	SHORTV		
0212	REP	1		4384	FRANKMSK	EQUALS BANKMASK		
0213	REP	22	LAST 299	6242 00122 0	LVBUP	ADRES	VBUP	

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P0214 THE FOLLOWING IS THE JUMP TABLE FOR OP CODES WHICH MAY HAVE INDEXABLE ADDRESSES OR MAY PUSH UP.

0216	RESP	1	6243	1 6454 0	INDJMP	TCP	VLOAD	00 - LOAD MPAC WITH A VECTOR.
0217	RESP	1	6244	1 7040 0		TCP	DAD	01 - TRIPLE PRECISION ADD TO MPAC.
0218	RESP	1	6245	1 7624 1		TCP	SIGN	02 - COMPLEMENT MPAC (V OR SC) IF X NEG.
0219	RESP	1	6246	1 7350 1		TCP	VXSC	03 - VECTOR TIMES SCALAR.
0220	RESP	1	6247	1 6652 1		TCP	CGOTO	04 - COMPUTED GO TO.
0221	RESP	2 LAST 398	6250	1 6437 0		TCP	TLOAD	05 - LOAD MPAC WITH TRIPLE PRECISION.
0222	RESP	1	6251	1 6021 0		TCP	DLOAD	06 - LOAD MPAC WITH A DP SCALAR.
0223	RESP	1	6252	1 7573 0		TCP	V/SC	07 - VECTOR DIVIDED BY SCALAR.
0224	RESP	1	6253	1 6450 1		TCP	SLOAD	10 - LOAD MPAC IN SINGLE PRECISION.
0225	RESP	1	6254	1 6567 1		TCP	SSP	11 - SET SINGLE PRECISION INTO X.
0226	RESP	1	6255	1 6472 1		TCP	PDOL	12 - PUSH DOWN MPAC AND RE-LOAD IN DP.
0227	RESP	1	6256	1 7303 1		TCP	MVX	13 - MATRIX POST-MULTIPLIED BY VECTOR.
0228	RESP	1	6257	1 6526 1		TCP	PDVL	14 - PUSH DOWN AND VECTOR LOAD.
0229	RESP	1	6260	1 6575 1		TCP	CCALL	15 - COMPUTED CALL.
0230	RESP	1	6261	1 7308 1		TCP	VXM	16 - MATRIX PRE-MULTIPLIED BY VECTOR.
0231	RESP	1	6262	1 7565 1		TCP	TSLC	17 - NORMALIZE MPAC (SCALAR ONLY).
0232	RESP	1	6263	1 7543 0		TCP	DMPR	20 - DP MULTIPLY AND ROUND.
0233	RESP	1	6264	1 7546 0		TCP	DDV	21 - DP DIVIDE BY.
0234	RESP	1	6265	1 7552 0		TCP	BDDV	22 - DP DIVIDE INTO.
0235	RESP	1	6266	1 7570 0		TCP	GSHIFT	23 - GENERAL SHIFT INSTRUCTION.
0236	RESP	1	6267	1 6720 0		TCP	VAD	24 - VECTOR ADD.
0237	RESP	1	6270	1 6716 0		TCP	VSU	25 - VECTOR SUBTRACT.
0238	RESP	1	6271	1 7005 1		TCP	BVSU	26 - VECTOR SUBTRACT FROM.
0239	RESP	1	6272	1 7300 1		TCP	DOT	27 - VECTOR DOT PRODUCT.
0240	RESP	1	6273	1 7427 0		TCP	VXV	30 - VECTOR CROSS PRODUCT.
0241	RESP	1	6274	1 7374 1		TCP	VPROJ	31 - VECTOR PROJECTION.
0242	RESP	1	6275	1 6754 0		TCP	DSU	32 - DP SUBTRACT.
0243	RESP	1	6276	1 7031 0		TCP	BOSU	33 - DP SUBTRACT FROM.
0244	RESP	1	6277	1 6744 1		TCP	DAD	34 - DP ADD.
0245			6300	1 6300 0		TCP		35 - AVAILABLE
0246	RESP	1	6301	1 7541 1		TCP	DMP1	36 - DP MULTIPLY.
0247	RESP	1	6302	1 7562 0		TCP	SETPD	37 - SET PUSH DOWN POINTER (DIRECT ONLY).

R0248 CODES 10 AND 14 MUST NOT PUSH UP. CODE 04 MAY BE USED FOR VECTOR DECLARE BEFORE PUSHUP IF DESIRED.

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P0250 THE FOLLOWING JUMP TABLE APPLIES TO INDEX, BRANCH, AND MISCELLANEOUS INSTRUCTIONS.

0252	REP	1	6303	1	2371	1	MISJCJMP	TCP	AXT	00 - ADDRESS TO INDEX TRUE.
0253	REP	1	6304	1	2376	0		TCP	AXC	01 - ADDRESS TO INDEX COMPLEMENTED.
0254	REP	1	6305	1	2401	1		TCP	LXA	02 - LOAD INDEX FROM ERASABLE.
0255	REP	1	6306	1	2405	0		TCP	LXC	03 - LOAD INDEX FROM COMPLEMENT OF ERAS.
0256	REP	1	6307	1	2411	0		TCP	SXA	04 - STORE INDEX IN ERASABLE.
0257	REP	1	6310	1	2417	0		TCP	XCHX	05 - EXCHANGE INDEX WITH ERASABLE.
0258	REP	1	6311	1	2433	0		TCP	INCR	06 - INCREMENT INDEX REGISTER.
0259	REP	1	6312	1	2442	0		TCP	TIX	07 - TRANSFER ON INDEX.
0260	REP	1	6313	1	2425	1		TCP	XAD	10 - INDEX REGISTER ADD FROM ERASABLE.
0261	REP	1	6314	1	2438	0		TCP	XSU	11 - INDEX SUBTRACT FROM ERASABLE.
0262	REP	1	6315	1	2514	1		TCP	BZE/GOTO	12 - BRANCH ZERO AND GOTO.
0263	REP	1	6316	1	2521	1		TCP	BPL/RMN	13 - BRANCH PLUS AND BRANCH MINUS.
0264	REP	1	6317	1	2474	0		TCP	RTB/RHIZ	14 - RETURN TO BASIC AND BRANCH HI ZERO.
0265	REP	1	6320	1	2534	0		TCP	CALL/ITA	15 - CALL AND STORE QPRET.
0266	REP	1	6321	1	2543	0		TCP	SW/	16 - SWITCH INSTRUCTIONS AND AVAILABLE.
0267	REP	1	6322	1	2504	0		TCP	BO/(B)	17 - BRANCH ON OVERFLOW TO BASIC OR INT.

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P0268 THE FOLLOWING JUMP TABLE APPLIES TO UNARY INSTRUCTIONS.

0269	REP	1		COUNT	00/INTER	
0270			00,2000			
0271	REP	1	00,2000 1 3207 0	UNAJUMP	TCP	00 - EXIT - DETECTED EARLIER.
0272	REP	1	00,2001 1 3527 0		TCP	01 - SQUARE ROOT.
0273	REP	1	00,2002 1 3516 1		TCP	02 - SIN.
0274	REP	1	00,2003 1 3607 1		TCP	03 - COS.
0275	REP	1	00,2004 1 3811 0		TCP	04 - ARC SIN.
0276	REP	1	00,2005 1 3174 1		TCP	05 - ARC COS.
0277	REP	1	00,2006 1 2116 1		TCP	06 - DP SQUARE.
						07 - ROUND TO DP.
0278	REP	1	00,2007 1 T637 0		TCP	10 - COMPLEMENT VECTOR OR SCALAR.
0279	REP	1	00,2010 1 3232 0		TCP	11 - VECTOR DEFINE.
0280	REP	1	00,2011 1 3023 1		TCP	12 - UNIT VECTOR.
0281	REP	1	00,2012 1 3176 0		TCP	13 - LENGTH OF VECTOR OR MAG OF SCALAR.
0282	REP	1	00,2013 1 3245 0		TCP	14 - SQUARE OF LENGTH OF VECTOR.
0283	REP	1	00,2014 1 6323 1		TCP	15 - PUSH UP ON STORE CODE.
0284	REP	1	00,2015 1 3274 1		TCP	16 - RETURN VIA OPRET.
0285	REP	1	00,2016 1 3247 1		TCP	17 - PUSH MPAC DOWN.

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P0286 SECTION 2 LOAD AND STORE PACKAGE.

R0287 A SET OF EIGHT STORE CODES IS PROVIDED AS THE PRIMARY METHOD OF STORING THE MULTI-PURPOSE  
 R0289 ACCUMULATOR (MPAC). IF IN THE DANZIG SECTION LOC REFERS TO AN ALGEBRAICALLY POSITIVE WORD, IT IS TAKEN AS A  
 R0291 STORE CODE WITH A CORRESPONDING ERASABLE ADDRESS. MOST OF THESE CODES ARE TWO ADDRESS, SPECIFYING THAT THE WORD  
 R0293 FOLLOWING THE STORE CODE IS TO BE USED AS AN ADDRESS FROM WHICH TO RE-LOAD MPAC. FOUR OPTIONS ARE AVAILABLE.

R0295 1. STORE STORE MPAC. THE B ADDRESS MAY BE INDEXED.  
 R0297 2. STOOL STORE MPAC AND RE-LOAD IT IN DP WITH THE NEXT ADDRESS (THE LOAD MAY BE INDEXED).  
 R0299 3. STOVL STORE MPAC AND RE-LOAD A VECTOR (AS ABOVE).  
 R0301 4. STCALL STORE AND DO A CALL (BOTH ADDRESSES MUST BE DIRECT HERE).

R0303 STOOL AND STOVL WILL TAKE FROM THE PUSH-DOWN LIST IF NO LOAD ADDRESS IS GIVEN.  
 0305 6323 BLOCK 3

0306 REP 2 LAST 1077 TO 1088' 205 205\* COUNT 03/INTER

0307 REP 4 LAST 1078	6323 3 0165 0	STADR	CA	BANKSET	THE STADR CODE (PUSHUP UP ON STORE ADDRESS) ENTERS HERE.
0308 REP 15 LAST 1085	6324 54 004 1		TS	FRANK	
0309 REP 16 LAST 1084	6325 24 164 1		INCR	LOC	
0310 REP 17 LAST 1089	6328 50 184 I	ITR1	INDEX	LOC	
0311	6327 4 0000 0		CS	0	
0312 REP 23 LAST 1089	6330 6 7716 0		AD	NEGONE	
0313 REP 14 LAST 1083	6331 54 116 0	DOSTORE	TS	ADDRMD	
0314 REP 7 LAST 373	6332 7 4372 I		MASK	LOWII	
0315 REP 15 LAST 1089	6333 56 116 I		XCH	ADDRMD	
0316 REP 1	6334 7 7671 I		MASK	B12T14	
0317	6335 0 0008 I		EXTEND		
0318 REP 38 LAST 1013	6336 7 4708 0		MP	BITS	
0319 REP 288 LAST 1085	6337 50 000 1	ITR0	INDEX	A	
0320 REP 1	6340 I 6341 0		TCP	STORAMP	EACH TRANSFER VECTOR ENTRY IS TWO WORDS.

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P0321 STORE CODE JUMP TABLE. CALLS THE APPROPRIATE STORING ROUTINE AND EXITS TO DANZIG OR TO ADDRESS WITH  
R0323 A SUPPLIED OPERATION CODE.

R03231 STORE STORE,1 AND STORE,2 RETURN TO DANZIG, THUS RESETTING THE EBANK TO ITS STATE AT INTPRET.

0324	REP	1	6341	0 6371 1	STORJUMP	TC	STORE	STORE.
0325	REP	9 LAST 754	6342	1 6030 0		TCP	DANZIG	PICK UP NEW OP CODE(S).
0326	REP	1	6343	0 6363 1		TC	STORE,1	
0327	REP	10 LAST 1090	6344	1 6030 0		TCP	DANZIG	
0328	REP	1	6345	0 6366 1		TC	STORE,2	
0329	REP	11 LAST 1090	6346	1 6030 0		TCP	DANZIG	
0330	REP	2 LAST 1090	6347	0 6371 1		TC	STORE	
0331	REP	1	6350	1 6427 1		TCP	DOLOAD	STOVL.
0332	REP	3 LAST 1090	6351	0 6371 1		TC	STORE	
0333	REP	1	6352	1 6113 0		TCP	DOLOAD*	STOVL WITH INDEXED LOAD ADDRESS.
0334	REP	4 LAST 1090	6353	0 6371 1		TC	STORE	
0335	REP	1	6354	1 6432 0		TCP	DOVLOAD	STOVL.
0336	REP	5 LAST 1090	6355	0 6371 1		TC	STORE	
0337	REP	1	6356	1 6435 1		TCP	DOVLOAD*	STOVL WITH INDEXED LOAD ADDRESS.
0338	REP	6 LAST 1090	6357	0 6371 1		TC	STORE	
0339	REP	1	6360	3 4723 0		CAP	CALLCODE	STOIC.
0340	REP	26 LAST 1085	6361	54 020 1		TS	CYR	
0341	REP	1	6362	1 6221 1		TCP	15BITADR	GET A 15 BIT ADDRESS.

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P0342 STORE CODE ADDRESS PROCESSOR.

0343	REP	21	LAST	1081	6363	50	120	1	STORE,1	INDEX	FIXLOC	
0344	REP	49	LAST	1081	6364	4	0046	1		C8	X1	
0345	REP	1			6365	1	6370	1		TCP	PRESTORE	
0346	REP	22	LAST	1091	6386	50	120	1	STORE,2	INDEX	FIXLOC	
0347	REP	26	LAST	890	6387	4	0047	0		C8	X2	
0348	REP	16	LAST	1089	6370	28	116	0	PRESTORE	ADS	ADDRMD	RESULTANT ADDRESS IS IN ERASABLE.
0349	REP	17	LAST	1091	6371	4	0116	0	STORE2	C8	ADDRMD	
0350	REP	2	LAST	941	6372	6	4727	1		AD	DEC45	
0351	REP	287	LAST	1089	6373	10	0000	0		CCS	A	DOES THE ADDRESS POINT TO THE WORK AREA? YES.
0352	REP	23	LAST	1091	6374	3	0120	1		CA	FIXLOC	
0353	REP	1			6375	1	6402	0		TCP	AHEADS	
0354	REP	5	LAST	1081	6376	3	4744	1		CA	OCT1400	
0355	REP	18	LAST	1091	6377	58	116	1		XCH	ADDRMD	
0356	REP	48	LAST	1081	6400	54	003	0		TS	EBANK	
0357	REP	10	LAST	1081	6401	7	4373	0		MASK	LOW8	
0358	REP	19	LAST	1091	6402	28	116	0	AHEADS	ADS	ADDRMD	

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P0359 SWIRLING ROUTINES. STORE DP, TP, OR VECTOR AS INDICATED BY MODE.

0360		6403 0 0006 1	STARTSTO EXTEND	
0361		REFERENCE (5) REFERS TO A STARTSTO.		MPAC,+1 MUST BE STORED IN ANY EVENT.
0362	REF 291	LAST 1078	6404 3 0155 0	DCA MPAC
0363	REF 20	LAST 1091	6405 50 116 1	INDEX ADDRWD
0364			6406 52 001 1	DXCH 0
0365	REF 8	LAST 1085	6407 10 163 1	CCS MODE
0366	REF 1		6410 1 6423 0	TCF TSTORE
0367	REF 229	LAST 1078	6411 0 0002 0	TC Q
0368		6412 0 0006 1	VSTORE EXTEND	
0369	REF 292	LAST 1092	6413 3 0160 0	DCA MPAC +3
0370	REF 21	LAST 1092	6414 50 116 1	INDEX ADDRWD
0371			6415 52 003 0	DXCH 2
0372		6416 0 0006 1	EXTEND	
0373	REF 293	LAST 1092	6417 3 0162 1	DCA MPAC +5
0374	REF 22	LAST 1092	6420 50 116 1	INDEX ADDRWD
0375			6421 52 005 0	DXCH 4
0376	REF 230	LAST 1092	6422 0 0002 0	TC Q
0377	REF 294	LAST 1092	6423 3 0156 0	TSTORE CA MPAC +2
0378	REF 23	LAST 1092	6424 50 116 1	INDEX ADDRWD
0379			6425 54 002 1	TS 2
0380	REF 231	LAST 1092	6426 0 0002 0	TC Q

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P0381 ROUTINES TO BEGIN PROCESSING OF THE SECOND ADDRESS ASSOCIATED WITH ALL STORE-TYPE CODES EXCEPT STORE  
R0383 ITSELF.

0384	REP	1	6427	3 7701 0	DDLOAD	CAP	DLOADCOD	
0385	REP	27	LAST 1090	6430	54 020 1	TS	CYR	
0386	REP	1		6431	1 6055 0	TCP	DIRADRES	GO GET A DIRECT ADDRESS.
0387	REP	1	6432	3 4674 0	DOVLOAD	CAP	VLOADCOD	
0388	REP	28	LAST 1093	6433	54 020 1	TS	CYR	
0389	REP	2	LAST 1093	6434	1 6055 0	TCP	DIRADRES	
0390	REP	1	6435	3 6056 1	DOVLOAD*	CAP	VLOAD*	
0391	REP	2	LAST 1090	6436	1 6114 1	TCP	DLOAD*	+1 PROLOGUE TO INDEX ROUTINE.

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P0392 THE FOLLOWING LOAD INSTRUCTIONS ARE PROVIDED FOR LOADING THE MULTI-PURPOSE ACCUMULATOR MPAC.

0394	REP 24	LAST 1092	6437 50 116 1	TLOAD	INDEX	ADDRWD	
0395			6440 3 0002 0		CA	2	LOAD A TRIPLE PRECISION ARGUMENT INTO
0396	REP 295	LAST 1092	6441 54 156 1		TS	MPAC +2	THE FIRST THREE MPAC REGISTERS, WITH THE
0397			6442 0 0006 1		EXTEND		CONTENTS OF THE OTHER FOUR IRRELEVANT.
0398	REP 25	LAST 1094	6443 5 0116 1		INDEX	ADDRWD	
0399			6444 3 0001 0		DCA	0	
0400	REP 296	LAST 1094	6445 52 155 1		DXCH	MPAC	
0401	REP 133	LAST 1058	6446 3 4712 1	TMODE	CAP	ONE	
0402	REP 1		6447 1 6027 0		TCP	NEWMODE	DECLARE TRIPLE PRECISION MODE.
0403			6450 22 007 0	SLOAD	ZL		
0404	REP 28	LAST 1094	6451 50 116 1		INDEX	ADDRWD	LOAD A SINGLE PRECISION NUMBER INTO
0405			6452 3 0000 1		CA	0	MPAC, SETTING MPAC+1,2 TO ZERO. THE
0406	REP 1		6453 1 6024 0		TCP	SLOAD2	CONTENTS OF THE REMAINING MPAC REGISTERS
0407			6454 0 0006 1	VLOAD	EXTEND		ARE IRRELEVANT.
0408	REP 27	LAST 1094	6455 5 0116 1		INDEX	ADDRWD	
0409			6456 3 0001 0		DCA	0	LOAD A DOUBLE PRECISION VECTOR INTO
0410	REP 297	LAST 1094	6457 52 155 1		DXCH	MPAC	MPAC,+1, MPAC+3,4, AND MPAC+5,6. THE
0411			6460 0 0006 1	ENDVLOAD	EXTEND		CONTENTS OF MPAC +2 ARE IRRELEVANT.
0412	REP 28	LAST 1094	6461 5 0116 1		INDEX	ADDRWD	
0413			6462 3 0003 1		DCA	2	PDVL COMES HERE TO FINISH UP FOR DP, IP.
0414	REP 298	LAST 1094	6463 52 160 1		DXCH	MPAC +3	
0415			6464 0 0006 1	+4	EXTEND		TPDVL FINISHES HERE.
0416	REP 29	LAST 1094	6465 5 0116 1		INDEX	ADDRWD	
0417			6466 3 0005 1		DCA	4	
0418	REP 299	LAST 1094	6467 52 162 0		DXCH	MPAC +5	
0419	REP 134	LAST 1094	6470 4 4712 0	VMODE	CS	ONE	
0420	REP 2	LAST 1094	6471 1 6027 0		TCP	NEWMODE	DECLARE VECTOR MODE.

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P0421 THE FOLLOWING INSTRUCTIONS ARE PROVIDED FOR STORING OPERANDS IN THE PUSHDOWN LIST:

R0423	1. PUSH	PUSHDOWN AND NO LOAD.						
R0424	2. PDOL	PUSHDOWN AND DOUBLE PRECISION LOAD.						
R0425	3. PDVL	PUSHDOWN AND VECTOR LOAD.						
0426		6472	0 0006 1	PDDL	EXTEND			
0427	REP 30	LAST 1094	6473	5 0116 1	INDEX	ADORMD	LOAD MPAC,+1, PUSHING THE FORMER	
0428			6474	3 0001 0	DCA	0	CONTENTS DOWN.	
0429	REP 300	LAST 1094	6475	52 155 1	DXCH	MPAC		
0430	REP 2	LAST 1083	6476	50 166 0	INDEX	PUSHLOC		
0431			6477	52 001 1	DXCH	0		
0432	REP 9	LAST 1092	6500	50 163 0	INDEX	MODE		
0433	REP 3	LAST 1083	6501	3 6213 1	CAP	NO.WDS	ADVANCE THE PUSHDOWN POINTER APPRO-	
0434	REP 3	LAST 1095	6502	26 166 1	ADS	PUSHLOC	PRIATELY.	
0435	REP 10	LAST 1095	6503	10 163 1	CCS	MODE		
0436	REP 1		6504	1 6521 0	TCP	ENDTPUSH		
0437	REP 1		6505	1 6517 0	TCP	ENDDPUSH		
0438	REP 11	LAST 1095	6506	54 163 1	TS	MODE	NOW DP.	
0439	REP 301	LAST 1095	6507	54 156 1	ENDVPUSH	TS	MPAC +2	
0440	REP 302	LAST 1095	6510	52 160 1	DXCH	MPAC +3	PUSH DOWN THE REST OF THE VECTOR HERE.	
0441	REP 4	LAST 1095	6511	50 166 0	INDEX	PUSHLOC		
0442			6512	51-775 0	DXCH	0 -4		
0443	REP 303	LAST 1095	6513	52 162 0	DXCH	MPAC +5		
0444	REP 5	LAST 1095	6514	50 166 0	INDEX	PUSHLOC		
0445			6515	51-777 1	DXCH	0 -2		
0446	REP 12	LAST 1090	6516	1 6030 0	TCP	DANZIG		
0447	REP 304	LAST 1095	6517	54 156 1	ENDDPUSH	TS	MPAC +2	SET MPAC +2 TO ZERO AND EXIT ON DP.
0448	REP 13	LAST 1095	6520	1 6030 0	TCP	DANZIG		
0449	REP 12	LAST 1095	6521	54 163 1	ENDTPUSH	TS	MODE	
0450	REP 305	LAST 1095	6522	56 156 0	XCH	MPAC +2	ON TRIPLE, SET MPAC +2 TO ZERO, PUSHING	
0451	REP 6	LAST 1095	6523	50 166 0	+2	INDEX	DOWN THE OLD CONTENTS	
0452			6524	53-777 0	TS	0 -1		
0453	REP 14	LAST 1095	6525	1 6030 0	TCP	DANZIG		

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## P0454 PDVL - PUSHDOWN AND VECTOR LOAD.

0455	REF 31 LAST 1095	6526 0 0006 1	PDVL	EXTEND	RELOAD MPAC AND PUSH DOWN ITS CONTENTS.	
0456		6527 5 0116 1		INDEX	ADDRWD	
0457		6530 3 0001 0		DCA	0	
0458	REF 308 LAST 1095	6531 52 155 1		DXCH	MPAC	
0459	REF 7 LAST 1095	6532 50 166 0		INDEX	PUSHLOC	
0460		6533 52 001 1		DXCH	0	
0461	REF 13 LAST 1095	6534 50 163 0		INDEX	MODE	ADVANCE THE PUSHDOWN POINTER.
0462	REF 4 LAST 1095	6535 3 6213 1		CAF	NO.WDS	
0463	REF 8 LAST 1096	6536 26 166 1		ADS	PUSHLOC	
0464	REF 14 LAST 1096	6537 10 163 1		CCS	MODE	TEST PAST MODE.
0465	REF 1	6540 1 6557 1		TCP	TPDVL	
0466	REF 1	6541 1 6460 1		TCP	ENDVLOAD	JUST LOAD LAST FOUR REGISTERS ON DP.
0467		6542 0 0006 1	VPDVL	EXTEND	PUSHDOWN AND RE-LOAD LAST TWO COMPONENTS	
0468	REF 32 LAST 1096	6543 5 0116 1		INDEX	ADDRWD	
0469		6544 3 0003 1		DCA	2	
0470	REF 307 LAST 1096	6545 52 160 1		DXCH	MPAC +3	
0471	REF 9 LAST 1096	6546 50 166 0		INDEX	PUSHLOC	
0472		6547 51<775 0		DXCH	0 -4	
0473		6550 0 0006 1		EXTEND		
0474	REF 33 LAST 1096	6551 5 0116 1		INDEX	ADDRWD	
0475		6552 3 0005 1		DCA	4	
0476	REF 308 LAST 1096	6553 52 162 0		DXCH	MPAC +5	
0477	REF 10 LAST 1096	6554 50 166 0		INDEX	PUSHLOC	
0478		6555 51<777 1		DXCH	0 -2	
0479	REF 15 LAST 1095	6556 1 6030 0		TCP	DANZIG	
0480		6557 0 0006 1	TPDVL	EXTEND	ON TP, WE MUST LOAD THE Y COMPONENT	
0481	REF 34 LAST 1096	6560 5 0116 1		INDEX	ADDRWD	BEFORE STORING MPAC +2 INCASE THIS IS A
0482		6561 3 0003 1		DCA	2	PUSHUP.
0483	REF 309 LAST 1096	6562 52 160 1		DXCH	MPAC +3	
0484	REF 310 LAST 1096	6563 3 0156 0		CA	MPAC +2	
0485	REF 11 LAST 1096	6564 50 166 0		INDEX	PUSHLOC	
0486		6565 53<777 0		TS	0 -1	IN DP.
0487	REF 2 LAST 1096	6566 1 6464 0		TCP	ENDVLOAD +4	
R0488	SSP (STORE SINGLE PRECISION) IS EXECUTED HERE.					
0489	REF 18 LAST 1089	6567 24 164 1	SSP	INCR	LOC	PICK UP THE WORD FOLLOWING THE GIVEN
0490	REF 19 LAST 1096	6570 50 164 1		INDEX	LOC	ADDRESS AND STORE IT AT X.
0491		6571 3 0000 1		CA	0	
0492	REF 35 LAST 1096	6572 50 116 1	STORE1	INDEX	ADDRWD	SOME INDEX AND MISCELLANEOUS OPS END
0493		6573 54 000 0		TS	0	HERE.

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0494 RESP 16 LAST 1096 6574 1 6030 0

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P0495 SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

R0496 THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES:

R0496	1. GOTO	GO TO.
R0499	2. CALL	CALL SUBROUTINE SETTING QPRET.
R0500	3. CGOTO	COMPUTED GO TO.
R0501	4. CCALL	COMPUTED CALL.
R0502	7. BPL	BRANCH IF MPAC POSITIVE OR ZERO.
R0503	6. BZB	BRANCH IF MPAC ZERO.
R0504	9. BNN	BRANCH IF MPAC NEGATIVE NON-ZERO.

0505 REP 20 LAST 1096	6575 24 184 1	CCALL	INCR	LOC	MAINTAIN LOC FOR QPRET COMPUTATION.
0506 REP 21 LAST 1096	6576 50 184 1		INDEX	LOC	
0507	6577 3 0000 1		CAP	0	GET BASE ADDRESS OF CADR LIST.
0508 REP 36 LAST 1096	6600 50 118 1		INDEX	ADORMD	
0509	6601 6 0000 1		AD	0	ADD INCREMENT.
0510 REP 16 LAST 1069	6602 54 004 1		TS	FBANK	SELECT DESIRED CADR.
0511 REP 16 LAST 1081	6603 7 4747 0		MASK	LOW10	
0512 REP 286 LAST 1091	6604 50 000 1		INDEX	A	
0513	6605 3 2000 0		CAP	10000	
0514 REP 6 LAST 1084	6606 54 117 1		TS	POLISH	
0515 REP 5 LAST 1089	6607 3 0185 0	CALL	CA	BANKSET	FOR ANY OF THE CALL OPTIONS, MAKE UP THE
0516 REP 2 LAST 1085	6610 7 4364 0		MASK	BANKMASK	ADDRESS OF THE NEXT OP-CODE PAIR/STORE
0517 REP 3 LAST 1098	6611 8 4364 1		AD	BANKMASK	CODE AND LEAVE IT IN QPRET. NOTE THAT
0518 REP 22 LAST 1098	6612 8 0184 1		AD	LOC	BANKMASK = -(2000 - 1).
0519 REP 24 LAST 1091	6613 50 120 1		INDEX	FIXLOC	
0520 REP 17 LAST 748	6614 54 052 1		TS	QPRET	
0521 REP 7 LAST 1096	6615 3 0117 0	GOTO	CA	POLISH	BASIC BRANCHING SEQUENCE.
0522 REP 4 LAST 1061	6618 7 7711 0	+1	MASK	HIGH4	
0523	6617 0 0008 1		EXTEND		
0524 REP 1	6620 1 6831 1		BZF	GOTOERS	SER IF ADDRESS POINTS TO FIXED OR ERAS.
0525 REP 6 LAST 1098	6621 3 0185 0	+4	CA	BANKSET	SET EBANK PART OF BBANK. NEXT, SET UP
0526 REP 16 LAST 1078	6622 54 006 0		TS	BBANK	FBANK. THE COMBINATION IS PICKED UP d
0527 REP 8 LAST 1098	6623 3 0117 0		CA	POLISH	PUT INTO BANKSET AT INTPRET +2.
0528 REP 17 LAST 1098	6624 54 004 1		TS	FBANK	
0529 REP 17 LAST 1098	6625 7 4747 0		MASK	LOW10	
0530 REP 2 LAST 1081	6626 6 4700 1		AD	2K	
0531 REP 23 LAST 1098	6627 54 184 0		TS	LOC	
0532 REP 227 LAST 1077	6630 1 6011 0		TCP	INTPRET +3	
0533	E3,1400		EBANK= 1400		SO YUL DOESN'T CUSS THE &CA 14008 BELOW.
0534 REP 9 LAST 1098	6631 3 0117 0	GOTOERS	CA	POLISH	THE GIVEN ADDRESS IS IN ERASABLE - SEE
0535 REP 2 LAST 1080	6632 6 6220 1		AD	-ENDVAC	IF RELATIVE TO THE WORK AREA.
0536 REP 289 LAST 1096	6633 10 000 0		CCS	A	GENERAL ERASABLE.
0537 REP 10 LAST 1096	6634 3 0117 0		CA	POLISH	
0538 REP 1	6635 1 6844 0		TCP	GOTOEP	

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0539	REP 25 LAST 1096	6636 3 0120 1	CA	FIXLOC	WORK AREA.	
0540	REP 11 LAST 1096	6637 6 0117 0	AD	POLISH	USE THE GIVEN ADDRESS AS THE ADDRESS OF THE BRANCH ADDRESS.	
0541	REP 290 LAST 1096	6640 50 000 1	INDEX	A		
0542		6641 3 0000 1	CA	0		
0543	REP 12 LAST 1099	6642 54 117 1	TS	POLISH	ALLOWS ARBITRARY INDIRECTNESS LEVELS.	
0544	REP 1	6643 1 6616 1	TCP	GOTO +1		
0545	REP 49 LAST 1091	6644 54 003 0	GOTOGE	TS	EBANK	
0546	REP 11 LAST 1091	6645 7 4373 0	MASK	LOW6		
0547	REP 291 LAST 1099	6646 50 000 1	INDEX	A		
0548		6647 3 1400 1	CA	1400		
0549	REP 13 LAST 1099	6650 54 117 1	TS	POLISH	USE THE GIVEN ADDRESS AS THE ADDRESS OF THE BRANCH ADDRESS.	
0550	REP 2 LAST 1099	6651 1 6616 1	TCP	GOTO +1		
0551	REP 24 LAST 1096	6652 50 164 1	CGOTO	INDEX	LOC	COMPUTED GO TO. PICK UP ADDRESS OF CADR LIST.
0552		6653 3 0001 0	CA	1		ADD MODIFIER.
0553	REP 37 LAST 1096	6654 50 116 1	INDEX	ADDRWD		
0554		6655 6 0000 1	AD	0		
0555	REP 16 LAST 1098	6656 54 004 1	TS	FBANK		
0556	REP 16 LAST 1098	6657 7 4747 0	MASK	LOW10		
0557	REP 292 LAST 1099	6660 50 000 1	INDEX	A		
0558		6661 3 2000 0	CA	10000		
0559	REP 14 LAST 1099	6662 54 117 1	TS	POLISH		
0560	REP 3 LAST 1099	6663 1 6616 1	TCP	GOTO +1	WITH ADDRESS IN A.	
0561	REP 7 LAST 1096	6664 3 0165 0	SWBRANCH	CA	BANKSET	SWITCH INSTRUCTIONS WHICH ELECT TO BRANCH COME HERE TO DO SO.
0562	REP 19 LAST 1099	6665 54 004 1	TS	FBANK		
0563	REP 25 LAST 1099	6666 50 164 1	INDEX	LOC		
0564		6667 3 0001 0	CA	1		
0565	REP 15 LAST 1099	6670 54 117 1	TS	POLISH		
0566	REP 4 LAST 1099	6671 1 6616 1	TCP	GOTO +1		

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P0567 TRIPLE PRECISION BRANCHING ROUTINE. IF CALLING TC IS AT L, RETURN IS AS FOLLOWS'

R0569 L+1 IF MPAC IS GREATER THAN ZERO.  
R0570 L+2 IF MPAC IS EQUAL TO +0 OR -0.  
R0571 L+3 IF MPAC IS LESS THAN ZERO.

0572	REF 311	LAST 1098	6672 10 154 0	BRANCH	CCS	MPAC	
0573	REF 232	LAST 1092	6673 0 0002 0		TC	0	
0574			6674 1 6676 1		TCP	+2	ON ZERO.
0575	REF 1		6675 1 6710 0		TCP	NEG	
0576	REF 312	LAST 1100	6676 10 155 1		CCS	MPAC +1	
0577	REF 233	LAST 1100	6677 0 0002 0		TC	0	
0578			6700 1 6702 0		TCP	+2	
0579	REF 2	LAST 1100	6701 1 8710 0		TCP	NEG	
0580	REF 313	LAST 1100	8702 10 158 1		CCS	MPAC +2	
0581	REF 234	LAST 1100	8703 0 0002 0		TC	0	
0582			8704 1 6706 1		TCP	+2	
0583	REF 3	LAST 1100	8705 1 6710 0		TCP	NEG	
0584	REF 235	LAST 1100	8706 50 002 0	Q+1	INDEX	0	
0585			8707 0 0001 0		TC	1	
0586	REF 236	LAST 1100	8710 50 002 0	NEG	INDEX	0	
0587			8711 0 0002 0		TC	2	IF FIRST NON-ZERO REGISTER WAS NEGATIVE.
0588	REF 4	LAST 1100	8710	Q+2	=	NEG	
R0589							
0590	REF 8	LAST 1099	8712 3 0185 0	EXIT	CA	BANKSET	
0591	REF 19	LAST 1098	8713 54 008 0		TS	BRANK	RESTORE USER-S BANK SETTING, AND LEAVE
0592	REF 26	LAST 1099	8714 50 184 1		INDEX	LOC	INTERPRETIVE MODE.
0593			8715 0 0001 0		TC	1	

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P0594 SECTION 3 - ADD/SUBTRACT PACKAGE.

R0595 THE FOLLOWING OPERATIONS ARE PROVIDED FOR ADDING TO AND SUBTRACTING FROM THE MULTI-PURPOSE ACCUMULATOR  
R0597 MPAC'

R0598	1. DAD	DOUBLE PRECISION ADD.
R0599	2. DSU	DOUBLE PRECISION SUBTRACT.
R0600	3. BDSU	DOUBLE PRECISION SUBTRACT FROM.
R0601	4. TAD	TRIPLE PRECISION ADD.
R0602	5. VAD	VECTOR ADD.
R0603	6. VSU	VECTOR SUBTRACT.
R0604	7. BVSU	VECTOR SUBTRACT FROM.

R0605 THE INTERPRETIVE OVERFLOW INDICATOR OVFLWD IS SET NON-ZERO IF OVERFLOW OCCURS IN ANY OF THE ABOVE.

0607	REF 44 LAST 1077	6716 3 4674 0 VSU	CAP	BIT15	CHANGES 0 TO DCS.
0608		6717 1 6721 1	TC	+2	
0609	REF 12 LAST 953	6720 3 4371 0 VAD	CAP	PRI030	CHANGES 0 TO DCA.
0610	REF 36 LAST 1099	6721 28 116 0	ADS	ADDRMD	
0611		6722 0 0006 1		EXTEND	
0612	REF 39 LAST 1101	6723 5 0116 1	INDEX	ADDRMD	
0613	REF 2 LAST 424	6724 00 003 1	READ	HISCALAR	DCA 2 OR DCS 2
0614	REF 314 LAST 1100	6725 20 160 1	DAS	MPAC +3	
0615		6726 0 0006 1	EXTEND		CHECK OVERFLOW.
0616		6727 1 6731 0	BZP	+2	
0617	REF 1	6730 0 6763 0	TC	OVERFLWY	
0618		6731 0 0006 1		EXTEND	
0619	REF 40 LAST 1101	6732 5 0116 1	INDEX	ADDRMD	
0620	REF 8 LAST 1033	6733 00 005 1	READ	CHANS	DCA 4 OR DCS 4
0621	REF 315 LAST 1101	6734 20 162 0	DAS	MPAC +5	
0622		6735 0 0006 1	EXTEND		
0623		6736 1 6740 0	BZP	+2	
0624	REF 1	6737 0 6760 0	TC	OVERFLWZ	
0625		6740 0 0006 1		EXTEND	
0626	REF 41 LAST 1101	6741 5 0116 1	INDEX	ADDRMD	
0627	REF 15 LAST 1049	6742 00 001 0	READ	LCHAN	DCA 0 OR DCS 0
0628	REF 1	6743 1 6747 1	TC	ENDVXV	
0629		6744 0 0006 1 DAD		EXTEND	
0630	REF 42 LAST 1101	6745 5 0116 1	INDEX	ADDRMD	
0631		6746 3 0001 0	DCA	0	
0632	REF 316 LAST 1101	6747 20 155 1 ENDVXV	DAS	MPAC	VXV FINISHES HERE.
0633		6750 0 0006 1	EXTEND		
0634	REF 17 LAST 1097	6751 1 6030 0	BZP	DANZIG	

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0635	REP 1	6752 0 6766 0	SETOVF	TC	OVERFLOW
0636	REP 18 LAST 1101	6753 1 6030 0		TCP	DANZIG

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0637	REF 43 LAST 1101	6754 0 0006 1	DSU	EXTEND	
0638	REF 43 LAST 1101	6755 5 0116 1		INDEX ADDRWD	
0639	REF 2 LAST 1101	6756 4 0001 1		DCS 0	
0640	REF 2 LAST 1101	6757 1 6747 1		TCP ENDVXV	
0641	REF 168 LAST 1075	6760 54 001 1	OVERFLWZ	TS L	ENTRY FOR THIRD COMPONENT.
0642	REF 26 LAST 1039	6761 3 4715 0		CAP FIVE	
0643		6762 1 6765 1		TCP +3	
0644	REF 169 LAST 1103	6763 54 001 1	OVERFLWY	TS L	ENTRY FOR SECOND COMPONENT.
0645	REF 40 LAST 1060	6764 3 6214 0		CAP THREE	
0646	REF 170 LAST 1103	6765 56 001 0		XCH L	
0647	REF 293 LAST 1099	6766 50 000 1	OVERFLOW	INDEX A	ENTRY FOR 1ST COMP OR DP (L=0).
0648	REF 5 LAST 1036	6767 4 4673 0		CS LIMITS	PICK UP POSMAX OR NEGMAX.
0649	REF 44 LAST 369	6770 54 130 1		TS BUF	
0650		6771 0 0006 1		EXTEND	
0651	REF 294 LAST 1103	6772 24 000 1		AUG A	
0652	REF 171 LAST 1103	6773 50 001 0		INDEX L	
0653	REF 317 LAST 1101	6774 26 155 1		ADS MPAC +1	
0654		6775 54 007 1		TS 7	
0655	REF 210 LAST 1077	6776 3 4714 1		CAP ZERO	
0656	REF 45 LAST 1103	6777 6 0130 0		AD BUF	
0657	REF 172 LAST 1103	7000 50 001 0		INDEX L	
0658	REF 318 LAST 1103	7001 26 154 0		ADS MPAC	
0659		7002 54 007 1		TS 7	
0660	REF 237 LAST 1100	7003 0 0002 0		TC 0	
0661	REF 1	7004 1 7121 0		TCP SETOVF2	NO OVERFLOW EXIT. SET OVFLD AND EXIT.
0662		7005 0 0006 1	BVSU	EXTEND	
0663	REF 44 LAST 1103	7006 5 0116 1		INDEX ADDRWD	
0664		7007 3 0003 1		DCA 2	
0665	REF 319 LAST 1103	7010 52 160 1		DCH MPAC +3	
0666		7011 0 0006 1		EXTEND	
0667		7012 4 0001 1		DCOM	
0668	REF 320 LAST 1103	7013 20 160 1		DAS MPAC +3	
0669		7014 0 0006 1		EXTEND	
0670		7015 1 7017 1		BZF +2	
0671	REF 2 LAST 1101	7016 0 6763 0		TC OVERFLWY	
0672		7017 0 0006 1		EXTEND	
0673	REF 45 LAST 1103	7020 5 0116 1		INDEX ADDRWD	
0674		7021 3 0005 1		DCA 4	
0675	REF 321 LAST 1103	7022 52 162 0		DCH MPAC +5	
0676		7023 0 0006 1		EXTEND	
0677		7024 4 0001 1		DCOM	
0678	REF 322 LAST 1103	7025 20 162 0		DAS MPAC +5	
0679		7026 0 0006 1		EXTEND	
0680		7027 1 7031 0		BZF +2	
0681	REF 2 LAST 1101	7030 0 6760 0		TC OVERFLWZ	

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0662		T031	0 0006 1	EDSU	EXTEND
0663	REP 46	LAST 1103	T032	5 0116 1	INDEX ADDRND
0664			T033	3 0001 0	DCA 0
0665	REP 323	LAST 1103	T034	52 155 1	DXCH MPAC
0666			T035	0 0006 1	EXTEND
0667			T036	4 0001 1	DCOM
0668	REP 3	LAST 1103	T037	1 6747 1	TCF ENDVXV

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P0689 TRIPLE PRECISION ADD ROUTINE.

0690			T040 0 0006 1	TAD	EXTEND	
0691	REP 47	LAST 1104	T041 5 0116 1		INDEX	ADDRMD
0692			T042 3 0002 0		DCA	1
0693	REP 324	LAST 1104	T043 20 156 1		DAS	MPAC +1
0694	REP 48	LAST 1105	T044 50 116 1		INDEX	ADDRMD
0695			T045 6 0000 1		AD	0
0696	REP 325	LAST 1105	T046 6 0154 1		AD	MPAC
0697	REP 326	LAST 1105	T047 54 154 0		TS	MPAC
0698	REP 19	LAST 1102	T050 1 6030 0		TCP	DANZIG
0699	REP 1		T051 1 6752 0		TCP	SET OVFND IF SUCH OCCURS.

ADD MINOR PARTS FIRST.

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P0700 ARITHMETIC SUBROUTINES REQUIRED IN FIXED-FIXED.

R0701	1. DMPSUB	DOUBLE PRECISION MULTIPLY. MULTIPLY THE CONTENTS OF MPAC,+1 BY THE DP WORD WHOSE ADDRESS IS IN ADDRWD AND LEAVE A TRIPLE PRECISION RESULT IN MPAC.	
R0703	2. ROUNDSUB	ROUND THE TRIPLE PRECISION CONTENTS OF MPAC TO DOUBLE PRECISION.	
R0705	3. DOTSUB	TAKE THE DOT PRODUCT OF THE VECTOR IN MPAC AND THE VECTOR WHOSE ADDRESS IS IN ADDRWD AND LEAVE THE TRIPLE PRECISION RESULT IN MPAC.	
R0707	4. POLY	USING THE CONTENTS OF MPAC AS A DP ARGUMENT, EVALUATE THE POLYNOMIAL WHOSE DEGREE AND COEFFICIENTS IMMEDIATELY FOLLOW THE TC POLY INSTRUCTION. (SEE ROUTINE FOR DETAILS.)	
0714	REF 236 LAST 1103	7052 50 002 0 DMP INDEX Q 7053 3 0000 1 CAP 0 7054 24 002 0 INCR 0 7055 54 116 0 -1 TS ADDRWD (PROLOGUE FOR SETTING ADDRWD.)	BASIC SUBROUTINE FOR USE BY PINBALL, ETC ADRES OF ARGUMENT FOLLOWS TC DMP
0715			
0716	REF 239 LAST 1108	7056 50 116 1 DMPSUB INDEX ADDRWD 7057 3 0001 0 CA 1	GET MINOR PART OF OPERAND AT C(ADDRWD).
0717	REF 49 LAST 1105	7060 54 156 1 TS MPAC +2 7061 3 4714 1 CAP ZERO 7062 58 155 0 XCH MPAC +1 7063 54 135 1 TS MPTEMP 7064 0 0006 1 EXTEND 7065 7 0156 1 MP MPAC +2	THIS WORKS FOR SQUARING MPAC AS WELL. SET MPAC +1 TO ZERO SO WE CAN ACCUMULATE THE PARTIAL PRODUCTS WITH DAS INSTRUCTIONS.
0718			
0719			
0720	REF 327 LAST 1105	7066 58 156 0 XCH MPAC +2 7067 0 0006 1 EXTEND	MINOR OF MPAC X MINOR OF C(ADDRWD).
0721	REF 211 LAST 1103	7070 7 0154 0 MP MPAC	DISCARD MINOR PART OF ABOVE RESULT AND FORM MAJOR OF MPAC X MINOR OF C(ADDRWD).
0722	REF 326 LAST 1108	7071 20 156 1 DAS MPAC +1	GUARANTEED NO OVERFLOW.
0723	REF 6 LAST 1074		
0724			
0725	REF 329 LAST 1106	7072 50 116 1 INDEX ADDRWD 7073 3 0000 1 CA 0	GET MAJOR PART OF ARGUMENT AT C(ADDRWD).
0726	REF 330 LAST 1106	7074 56 135 0 XCH MPTEMP 7075 0 0006 1 EXTEND	SAVE AND BRING OUT MINOR OF MPAC.
0727		7076 7 0135 1 MP MPTEMP	MAJOR OF C(ADDRWD) X MINOR OF MPAC.
0728	REF 331 LAST 1106	7077 20 156 1 DAS MPAC +1	ACCUMULATE, SETTING A TO NET OVERFLOW.
0729	REF 332 LAST 1106		
0730	REF 51 LAST 1106	7100 56 154 1 XCH MPAC 7101 0 0006 1 EXTEND	SETTING MPAC TO 0 OR +-1.
0731		7102 7 0135 1 MP MPTEMP	MAJOR OF MPAC X MAJOR OF C(ADDRWD).
0732	REF 9 LAST 1106	7103 20 155 1 DAS MPAC	GUARANTEED NO OVERFLOW.
0733			
0734	REF 10 LAST 1106	7104 0 0002 0 TC 0	49 MCT = .573 MS. INCLUDING RETURN.
0735	REF 333 LAST 1106		
0736	REF 334 LAST 1106		
0737			
0738	REF 11 LAST 1106		
0739	REF 335 LAST 1106		
0740	REF 240 LAST 1106		

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P0741 ROUND MPAC TO DOUBLE PRECISION, SETTING OVFIND ON THE RARE EVENT OF OVERFLOW.

0743	REF 212	LAST 1106	7105	3 4714 1	ROUND	SUB CAP	ZERO	SET MPAC +2 = 0 FOR SCALARS AND CHANGE
0744	REF 15	LAST 1098	7106	54 163 1	+1	TS	MODE	MODE TO DP.
0745	REF 336	LAST 1108	7107	56 158 0	VROUND	XCH	MPAC +2	BUT WE NEEDNT TAKE THE TIME FOR VECTORS.
0746			7110	8 0000 1		DOUBLE		
0747	REF 173	LAST 1103	7111	54 001 1		TS	L	
0748	REF 241	LAST 1106	7112	0 0002 0		TC	0	
0749	REF 337	LAST 1107	7113	6 0155 0		AD	MPAC +1	ADD ROUNDING BIT IF MPAC +2 WAS GREATER
0750	REF 338	LAST 1107	7114	54 155 1		TS	MPAC +1	THAN .5 IN MAGNITUDE.
0751	REF 242	LAST 1107	7115	0 0002 0		TC	0	
0752	REF 339	LAST 1107	7116	6 0154 1		AD	MPAC	PROPAGATE INTERFLOW.
0753	REF 340	LAST 1107	7117	54 154 0		TS	MPAC	
0754	REF 243	LAST 1107	7120	0 0002 0		TC	0	
0755	REF 2	LAST 844	7121	54 121 1	SETOVF2	TS	OVFIND	(RARE).
0756	REF 244	LAST 1107	7122	0 0002 0		TC	0	

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P0757 THE DOT PRODUCT SUBROUTINE USUALLY FORMS THE DOT PRODUCT OF THE VECTOR IN MPAC WITH A STANDARD SIX  
 R0759 REGISTER VECTOR WHOSE ADDRESS IS IN ADDR. IN THIS CASE C(DOTINC) ARE SET TO 2. VXM, HOWEVER, SETS C(DOTINC) TO  
 R0761 6 SO THAT DOTSUB DOTS MPAC WITH A COLUMN VECTOR OF THE MATRIX IN QUESTION IN THIS CASE.  
 0763 REP 52 LAST 1071 7123 3 4711 1 PREDOT CAP TWO  
 0764 REP 4 LAST 66 7124 54 136 1 TS DOTINC PROLOGUE TO SET DOTINC TO 2.  
 0765  
 0766 REP 5 LAST 66 7125 0 0008 1 DOTSUB EXTEND  
 0767 REP 1 7126 22 137 1 QCH DOTRET  
 0768 REP 341 LAST 1107 7127 0 7058 0 TC DMPSUB  
 0769 REP 342 LAST 1108 7130 52 160 1 DXCH MPAC +3  
 0770 REP 46 LAST 1103 7131 52 155 1 DXCH MPAC  
 0771 REP 343 LAST 1108 7132 52 131 0 DXCH BUF  
 0772 REP 47 LAST 1108 7133 3 0156 0 CA MPAC +2  
 0773 REP 5 LAST 1108 7134 54 132 0 TS BUF +2  
 0774 REP 52 LAST 1108 7135 3 0138 0 CA DOTINC  
 0775 REP 2 LAST 1108 7136 26 118 0 ADS ADDRWD  
 0776 REP 344 LAST 1108 7137 0 7058 0 TC DMPSUB  
 0777 REP 48 LAST 1108 7140 52 158 1 DXCH MPAC +1  
 0778 REP 345 LAST 1108 7141 20 132 0 DAS BUF +1  
 0779 REP 49 LAST 1108 7142 6 0154 1 AD MPAC  
 0780 REP 50 LAST 1108 7143 8 0130 0 AD BUF  
 0781 REP 3 LAST 1107 7144 54 130 1 TS BUF  
 0782 REP 3 LAST 1107 7145 1 7147 0 TC +2  
 0783 REP 346 LAST 1108 7146 54 121 1 TS OVRIND  
 0784 REP 347 LAST 1108 7147 52 182 0 DXCH MPAC +5  
 0785 REP 6 LAST 1108 7150 52 155 1 DXCH MPAC  
 0786 REP 53 LAST 1108 7151 3 0138 0 CA DOTINC  
 0787 REP 3 LAST 1108 7152 26 118 0 ADS ADDRWD  
 0788 REP 51 LAST 1108 7153 0 7058 0 TC DMPSUB  
 0789 REP 348 LAST 1108 7154 52 132 0 ENDDOT DXCH BUF +1  
 0790 REP 349 LAST 1108 7155 20 158 1 DAS MPAC +1  
 0791 REP 52 LAST 1108 7156 6 0154 1 AD MPAC  
 0792 REP 350 LAST 1108 7157 6 0130 0 AD BUF  
 0793 REP 6 LAST 1108 7160 54 154 0 TS MPAC  
 0794 REP 2 LAST 1102 7161 0 0137 1 TC DOTRET  
 0795 REP 7 LAST 1108 7162 0 6768 0 TC OVRFLW  
 0796 REP 7 LAST 1108 7163 0 0137 1 TC DOTRET  
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**P0796 DOUBLE PRECISION POLYNOMIAL EVALUATOR**

THIS ROUTINE EVALUATES  $A_N X^N + A_{N-1} X^{N-1} + \dots + A_1 X + A_0$  LEAVING THE DP RESULT IN MPAC ON EXIT.

**R0801. THE ROUTINE HAS TWO ENTRIES**

R0602 1. ENTRY THRU POWRSRS. THE COEFFICIENTS MAY BE EITHER IN FIXED OR ERASABLE, THE CALL IS BY  
R0604 TC POWRSRS, AND THE RETURN IS TO LOC(TC POWRSRS)+1. THE ENTERING DATA MUST BE AS FOLLOWS

A0806	A	SP	LOC-3	ADDRESS FOR REFERENCING COEF TABLE
A0807	L	SP	N-1	N IS THE DEGREE OF THE POWER SERIES
A0808	MPAC	DP	X	ARGUMENT

	LOC-2N	DP	A(0)
A0809			
A0810			
A0811	LOC	DP	A(N)

2. ENTRY THRU POLY. THE CALL TO POLY AND THE ENTERING DATA MUST BE AS FOLLOWS

A0814- MPAC DP X ARGUMENT

<b>A0815</b>	LOC	TC	POLY
<b>A0816</b>	LOC+1	SP	N-1
<b>A0817</b>	LOC+2	DP	A(0)
<b>A0818</b>	LOC	TC	POLY

0820			T164	0 0006 1	POWRSRS	EXTEND			
0821	REF	1	T165	22 141 0	QXCH	POLYRET	RETURN ADDRESS		
0822	REF	16	LAST 1099	T166	54 117 1	T3	POLISH	POWER SERIES ADDRESS	
0823	REF	1		T167	22 140 1	LXCH	POLYCNT	N-1 TO COUNTER	
0824	REF	1		T170	1 7201 1	TOP	POLYCOM	SKIP SET UP BY POLY	
0825	REF	245	LAST 1107	T171	50 002 0	POLY	INDEX	0	
0826				T172	3 0000 1	CAP	0		
0827	REF	2	LAST 1109	T173	54 140 0	TS	POLYCNT	N-1 TO COUNTER	
0828				T174	6 0000 1	DOUBLE			
0829	REF	246	LAST 1109	T175	6 0002 0	AD	0		
0830	REF	17	LAST 1109	T176	54 117 1	TS	POLISH	L(A(N))-3 TO POLISH	
0831	REF	27	LAST 1103	T177	6 4715 0	AD	FIVE		
0832	REF	2	LAST 1109	T200	54 141 1	TS	POLYRET	STORE RETURN ADDRESS	
0833	REF	1		T201	3 6242 0	POLYCOM	CAP	LVBUP	
0834	REF	54	LAST 1108	T202	54 116 0	TS	ADDRWD	INCOMING X WILL BE MOVED TO VRUP, SO SET ADDRWD SO DMPSUB WILL MPY BY VRUP.	
0835				T203	0 0006 1	EXTEND			
0836	REF	18	LAST 1109	T204	5 0117 0	INDEX	POLISH		
0837				T205	3 0004 0	DCA	3		

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0838	REP	351	LAST	1108	7206	52 155 1	DXCH	MPAC	LOAD A(N) INTO MPAC,	
0839	REP	23	LAST	1085	7207	52 123 0	DXCH	VBUF	SAVING X IN VBUF	
0840	REP	1			7210	1 7214 0	TOP	POLY2		
0841	REP	3	LAST	1109	7211	54 140 0	POLYLOOP	TS	POLYCNT	SAVE DECREMENTED LOOP COUNTER
0842	REP	53	LAST	1108	7212	4 4711 0		CS	TWO	REGRESS COEFFICIENT POINTER
0843	REP	19	LAST	1109	7213	26 117 1		ADS	POLISH	
0844	REP	4	LAST	1108	7214	0 7056 0	POLY2	TC	DMPSUB	MULTIPLY BY X
0845					7215	0 0008 1		EXTEND		
0846	REP	20	LAST	1110	7216	5 0117 0		INDEX	POLISH	
0847					7217	3 0002 0		DCA	1	
0848	REP	352	LAST	1110	7220	20 155 1		DAS	MPAC	ADD IN NEXT COEFFICIENT USERS RESPONSIBILITY TO ASSURE NO OVFLOW
0849	REP	4	LAST	1110	7221	10 140 0		CCS	POLYCNT	
0850	REP	1			7222	1 7211 0		TCP	POLYLOOP	
0851	REP	3	LAST	1109	7223	0 0141 0		TC	POLYRET	RETURN CALLER

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P0852 MISCELLANEOUS MULTI-PRECISION ROUTINES REQUIRED IN FIXED-FIXED BUT NOT USED BY THE INTERPRETER.

085398	REF 213	ILAGST 1107	7224	3 4714 1	DPAGREE	CAF	ZERO	DOUBLE PRECISION ENTRY -
085399	REF 353	ILAGST 1110	7225	54 158 1		TS	MPAC +2	ZERO LOW-ORDER WORD
0854	REF 247	ILAGST 1109	7228	22 002 0	TPAGREE	LXCH	Q	FORCE SIGN AGREEMENT AMONG THE TRIPLE
0855	REF 1		7227	0 6872 1		TC	BRANCH	PRECISION CONTENTS OF MPAC. RETURNING
0856	REF 1		7230	1 7234 1		TCP	ARG+	WITH SIGNUM OF THE INPUT IN A.
0857	REF 1		7231	1 7254 1		TCP	ARGZERO	
0858	REF 28	ILAGST 1043	7232	4 4872 1		CS	POSMAX	IF NEGATIVE.
0859			7233	1 7235 0		TCP	+2	
0860	REF 29	ILAGST 1111	7234	3 4872 0	ARG+	CAF	POSMAX	
0861	REF 248	ILAGST 1111	7235	54 002 1		TS	Q	
0862			7236	0 0008 1			EXTEND	
0863	REF 295	ILAGST 1103	7237	24 000 1		AUG	A	FORMS +-1.0.
0864	REF 354	ILAGST 1111	7240	6 0158 0		AD	MPAC +2	
0865	REF 355	ILAGST 1111	7241	54 158 1		TS	MPAC +2	
0866	REF 214	ILAGST 1111	7242	3 4714 1		CAF	ZERO	
0867	REF 249	ILAGST 1111	7243	6 0002 0		AD	Q	
0868	REF 358	ILAGST 1111	7244	6 0155 0		AD	MPAC +1	
0869	REF 357	ILAGST 1111	7245	54 155 1		TS	MPAC +1	
0870	REF 215	ILAGST 1111	7248	3 4714 1		CAF	ZERO	
0871	REF 250	ILAGST 1111	7247	6 0002 0		AD	Q	Q STILL HAS POSMAX OR NEGMAX IN IT.
0872	REF 358	ILAGST 1111	7250	6 0154 1		AD	MPAC	ALWAYS SKIPPING UNLESS ARGZERO.
0873	REF 359	ILAGST 1111	7251	54 154 0	ARGZERO2	TS	MPAC	
0874	REF 360	ILAGST 1111	7252	54 155 1		TS	MPAC +1	
0875	REF 174	ILAGST 1107	7253	0 0001 0		TC	L	RETURN VIA L.
0876	REF 361	ILAGST 1111	7254	54 158 1	ARGZERO	TS	MPAC +2	SET ALL THREE MPAC REGISTERS TO ZERO.
0877	REF 1		7255	1 7251 1		TCP	ARGZERO2	

R0878 SHORIMP MULTIPLIES THE TP CONTENTS OF MPAC BY THE SINGLE PRECISION NUMBER ARRIVING IN A.

0880	REF 12	ILAGST 1108	7258	54 135 1	SHORIMP	TS	MPTEMP	
0881			7257	0 0008 1			EXTEND	
0882	REF 362	ILAGST 1111	7280	7 0158 1		MP	MPAC +2	
0883	REF 363	ILAGST 1111	7261	54 158 1		TS	MPAC +2	
0884	REF 218	ILAGST 1111	7282	3 4714 1	SHORIMP2	CAF	ZERO	SO SUBSEQUENT DAS WILL WORK.
0885	REF 364	ILAGST 1111	7283	56 155 0		XCH	MPAC +1	
0886	REF 1		7264	1 7075 0		TCP	DMPSUB2	

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R0887 DMPNSUB MULTIPLIES THE DP FRACTION ARRIVING IN MPAC BY THE SP  
R0888 INTEGER ARRIVING IN A. THE DP PRODUCT DEPARTS BOTH IN MPAC AND IN  
R0889 A AND L. NOTE THAT DMPNSUB NORMALLY INCREASES THE MAGNITUDE OF THE  
R0890 CONTENTS OF MPAC. THE CUSTOMER MUST INSURE THAT B(A) X B(MPAC,MPAC+1)  
R0891 AND B(A) X B(MPAC) ARE LESS THAN 1 IN MAGNITUDE, WHERE B, AS IS OBVIOUS,  
R0892 INDICATES THE ARRIVING CONTENTS.

0893	REP 1	7265	54 135 1	DMPNSUB	TS	DMPNTEMP	
0894		7266	0 0006 1		EXTEND		
0895	REP 365 LAST 1111	7267	7 0155 1	MP	MPAC	+1	
0896	REP 366 LAST 1112	7270	52 155 1	DXCH	MPAC		LOW PRODUCT TO MPAC, HIGH FACTOR TO A
0897		7271	0 0006 1	EXTEND			
0898	REP 2 LAST 1112	7272	7 0135 1	MP	DMPNTEMP		
0899	REP 175 LAST 1111	7273	3 0001 0	CA	L		
0900	REP 367 LAST 1112	7274	26 154 0	ADS	MPAC		COMPLETING THE PRODUCT IN MPAC
0901		7275	0 0006 1	EXTEND			
0902	REP 368 LAST 1112	7276	3 0155 0	DCA	MPAC		BRINGING THE PRODUCT INTO A AND L
0903	REP 251 LAST 1111	7277	0 0002 0	TC	Q		

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P0904 MISCELLANEOUS VECTOR OPERATIONS. INCLUDED HERE ARE THE FOLLOWING:

R0905	1. DOT	DP VECTOR DOT PRODUCT.			
R0906	2. VXV	DP VECTOR CROSS PRODUCT.			
R0907	3. VXSCL	DP VECTOR TIMES SCALAR.			
R0908	4. V/SC	DP VECTOR DIVIDED BY SCALAR.			
R0909	5. VPROJ	DP VECTOR PROJECTION. ((MPAC,X)MPAC).			
R0910	6. VXM	DP VECTOR POST-MULTIPLIED BY MATRIX.			
R0911	7. MXV	DP VECTOR PRE-MULTIPLIED BY MATRIX.			
0912	REP 1	7300 0 7123 0 DOT	TC	PREDOT	DO THE DOT PRODUCT AND EXIT, CHANGING THE MODE TO DP SCALAR.
0913	REP 217	LAST 1111	7301 3 4714 1 DMODE	CAP ZERO	
0914	REP 3	LAST 1094	7302 1 6027 0	TCF NEWMODE	
0915	REP 54	LAST 1110	7303 3 4711 1 MXV	CAP TWO	SET UP MATINC AND DOTINC FOR ROW VECTORS.
0916	REP 5	LAST 68	7304 54 140 0	TS MATINC	GO TO COMMON PORTION.
0917	REP 1	7305 1 7311 1	TCF	VXM/MXV	
0918	REP 9	LAST 1040	7306 4 4377 1 VXM	CS TEN	SET MATINC AND DOTINC TO REFER TO MATRIX AS THREE COLUMN VECTORS.
0919	REP 6	LAST 1113	7307 54 140 0	TS MATINC	
0920	REP 35	LAST 1028	7310 3 6211 0	CAP SIX	

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## P0921 COMMON PORTION OF MXV AND VXM.

0922	REP	7	LAST 1108	7311 54 136 1	VXM/MXV	TS	DOTINC	
R0923			ITRACE (2) REPRS TO AVXM/MXVA.					
0924	REP	1		7312 0 7501 1		TC	MPACVBUF	SAVE VECTOR IN MPAC FOR FURTHER USE.
0925	REP	1		7313 0 7125 0		TC	DOTSUB	GO DOT TO GET X COMPONENT OF ANSWER.
0926				7314 0 0006 1		EXTEND		
0927	REP	24	LAST 1110	7315 3 0123 1		DCA	VBUF	
0926	REP	369	LAST 1112	7316 52 155 1		DXCH	MPAC	
0929	REP	11	LAST 1074	7317 52 134 0		DXCH	BUF2	
0930				7320 0 0006 1		EXTEND		
0931	REP	25	LAST 1114	7321 3 0125 1		DCA	VBUF +2	
0932	REP	370	LAST 1114	7322 52 160 1		DXCH	MPAC +3	
0933				7323 0 0006 1		EXTEND		
0934	REP	26	LAST 1114	7324 3 0127 0		DCA	VBUF +4	
0935	REP	371	LAST 1114	7325 52 162 0		DXCH	MPAC +5	
0936	REP	7	LAST 1113	7326 3 0140 1		CA	MATINC	
0937	REP	55	LAST 1109	7327 26 116 0		ADS	ADDRWD	INITIALIZE ADDRWD FOR NEXT DOT PRODUCT. FORMS BASE ADDRESS OF NEXT COLUMN(ROW).
0938	REP	2	LAST 1114	7330 0 7125 0		TC	DOTSUB	
0939	REP	27	LAST 1114	7331 52 123 0		DXCH	VBUF	
0940	REP	372	LAST 1114	7332 52 155 1		DXCH	MPAC	
0941	REP	26	LAST 1114	7333 52 125 0		DXCH	VBUF +2	
0942	REP	373	LAST 1114	7334 52 160 1		DXCH	MPAC +3	
0943	REP	29	LAST 1114	7335 52 127 1		DXCH	VBUF +4	
0944	REP	374	LAST 1114	7336 52 162 0		DXCH	MPAC +5	
0945	REP	6	LAST 1114	7337 3 0140 1		CA	MATINC	
0946	REP	56	LAST 1114	7340 26 116 0		ADS	ADDRWD	FORM ADDRESS OF LAST COLUMN OR ROW.
0947	REP	3	LAST 1114	7341 0 7125 0		TC	DOTSUB	
0948	REP	12	LAST 1114	7342 52 134 0		DXCH	VBUF2	
0949	REP	375	LAST 1114	7343 52 155 1		DXCH	MPAC	
0950	REP	376	LAST 1114	7344 52 162 0		DXCH	MPAC +5	
0951	REP	30	LAST 1114	7345 52 125 0		DXCH	VBUF +2	
0952	REP	377	LAST 1114	7346 52 160 1		DXCH	MPAC +3	
0953	REP	20	LAST 1105	7347 1 6030 0		TOP	DANZIG	ANSWER NOW COMPLETE. PUT COMPONENTS INTO PROPER MPAC REGISTERS. EXIT.

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## P0954 VXSC - VECTOR TIMES SCALAR.

0955	REP	16	LAST	1107	7350	10 163 1	VXSC	CCS	MODE	TEST PRESENT MODE.
0956	REP	1			7351	1 7377 1		TC	DVXSC	SEPARATE ROUTINE WHEN SCALAR IS IN MPAC.
0957	REP	2	LAST	1115	7352	1 7377 1		TC	DVXSC	
0958	REP	5	LAST	1110	7353	0 7056 0	VVXSC	TC	DMPSUB	COMPUTE X COMPONENT
0959	REP	1			7354	0 7107 0		TC	VROUND	AND ROUND IT.
0960	REP	376	LAST	1114	7355	52 160 1		DXCH	MPAC +3	PUT Y COMPONENT INTO MPAC SAVING MPAC IN
0961	REP	379	LAST	1115	7356	52 155 1		DXCH	MPAC	MPAC +3.
0962	REP	380	LAST	1115	7357	52 160 1		DXCH	MPAC +3	
0963	REP	6	LAST	1115	7360	0 7056 0		TC	DMPSUB	DO SAME FOR Y AND Z COMPONENTS.
0964	REP	2	LAST	1115	7361	0 7107 0		TC	VROUND	
0965	REP	381	LAST	1115	7362	52 162 0		DXCH	MPAC +5	
0966	REP	382	LAST	1115	7363	52 155 1		DXCH	MPAC	
0967	REP	383	LAST	1115	7364	52 162 0		DXCH	MPAC +5	
0968	REP	7	LAST	1115	7365	0 7056 0		TC	DMPSUB	
0969	REP	3	LAST	1115	7366	0 7107 0		TC	VROUND	
0970	REP	384	LAST	1115	7367	52 155 1	VROTATEX	DXCH	MPAC	EXIT USED TO RESTORE MPAC AFTER THIS
0971	REP	385	LAST	1115	7370	52 162 0		DXCH	MPAC +5	TYPE OF ROTATION. CALLED BY VECTOR SHIFT
0972	REP	386	LAST	1115	7371	52 160 1		DXCH	MPAC +3	RIGHT, V/SC, ETC.
0973	REP	387	LAST	1115	7372	52 155 1		DXCH	MPAC	
0974	REP	21		1114	7373	1 6030 0		TC	DANZIG	

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P0975 DP VECTOR PROJECTION ROUTINE.

0976 RSP 2 LAST 1113 7374 0 7123 0 VPROJ TC PREDOT  
0977 RSP 15 LAST 1030 7375 4 4710 1 CS FOUR  
0978 RSP 57 LAST 1114 7378 26 118 0 ADS ADDRWD

(MPAC,X)MPAC IS COMPUTED AND LEFT IN  
MPAC. DO DOT AND FALL INTO DVXSC.

R0979 VXSC WHEN SCALAR ARRIVES IN MPAC AND VECTOR IS AT X.

0980 7377 0 0006 1 DVXSC EXTEND  
0981 RSP 386 LAST 1115 7400 3 0155 0 DCA MPAC  
0982 RSP 389 LAST 1116 7401 52 160 1 DXCH MPAC +3  
0983 RSP 8 LAST 1115 7402 0 7056 0 TC DMPSUB  
0984 RSP 4 LAST 1115 7403 0 7107 0 TC VROUND

SAVE SCALAR IN MPAC +3 AND GET X  
COMPONENT OF ANSWER.

0985 RSP 55 LAST 1113 7404 3 4711 1 CAP TWO  
0986 RSP 58 LAST 1118 7405 26 118 0 ADS ADDRWD  
0987 7406 0 0006 1 EXTEND  
0988 RSP 390 LAST 1116 7407 3 0180 0 DCA MPAC +3  
0989 RSP 391 LAST 1116 7410 52 155 1 DXCH MPAC  
0990 RSP 392 LAST 1118 7411 52 182 0 DXCH MPAC +5  
0991 RSP 9 LAST 1116 7412 0 7058 0 TC DMPSUB  
0992 RSP 5 LAST 1116 7413 0 7107 0 TC VROUND

ADVANCE ADDRWD TO Y COMPONENT OF X.

PUT SCALAR BACK INTO MPAC AND SAVE  
X RESULT IN MPAC +5.

0993 RSP 56 LAST 1116 7414 3 4711 1 CAP TWO  
0994 RSP 59 LAST 1116 7415 26 118 0 ADS ADDRWD  
0995 RSP 393 LAST 1116 7418 52 180 1 DXCH MPAC +3  
0998 RSP 394 LAST 1116 7417 52 155 1 DXCH MPAC  
0997 RSP 395 LAST 1116 7420 52 160 1 DXCH MPAC +3  
0998 RSP 10 LAST 1116 7421 0 7056 0 TC DMPSUB  
0999 RSP 6 LAST 1116 7422 0 7107 0 TC VROUND

TO Z COMPONENT.  
BRING SCALAR BACK, PUTTING Y RESULT IN  
THE PROPER PLACE.

1000 RSP 396 LAST 1116 7423 52 155 1 DXCH MPAC  
1001 RSP 397 LAST 1116 7424 52 182 0 DXCH MPAC +5  
1002 RSP 398 LAST 1116 7425 52 155 1 DXCH MPAC

PUT Z COMPONENT IN PROPER PLACE, ALSO  
POSITIONING X.

1003 RSP 1 7426 1 6470 0 TCP VMODE

MODE HAS CHANGED TO VECTOR.

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P1004 THE VECTOR CROSS PRODUCT ROUTINE CALCULATES ( $X_M \times X_M$ ,  $X_M \times X_M$ ,  $X_M \times X_M$ ) WHERE M IS THE VECTOR IN  
 R1006 3 2 2 3 1 3 3 1 2 1 1 2

R1008 MPAC AND X THE VECTOR AT THE GIVEN ADDRESS.

1009	7427	0 0006 1	VXV	EXTEND		
1010 REP 399 LAST 1116	7430	3 0162 1		DCA	MPAC +5	FORM UP M3X1, LEAVING M1 IN VBUF.
1011 REP 400 LAST 1117	7431	52 155 1		DXCH	MPAC	
1012 REP 31 LAST 1114	7432	52 123 0		DXCH	VBUF	
1013 REP 11 LAST 1116	7433	0 7056 0		TC	DMPSUB	BY X1.
1014	7434	0 0006 1		EXTEND		
1015 REP 401 LAST 1117	7435	4 0160 1		DCS	MPAC +3	CALCULATE -X1M2, SAVING X1M3 IN VBUF +2.
1016 REP 402 LAST 1117	7436	52 155 1		DXCH	MPAC	
1017 REP 32 LAST 1117	7437	52 125 0		DXCH	VBUF +2	
1018 REP 12 LAST 1117	7440	0 7056 0		TC	DMPSUB	
1019 REP 57 LAST 1116	7441	3 4711 1		CAP	TWO	ADVANCE ADDRWD TO X2.
1020 REP 60 LAST 1116	7442	28 116 0		ADS	ADDRWD	
1021	7443	0 0006 1		EXTEND		
1022 REP 403 LAST 1117	7444	4 0162 0		DCS	MPAC +5	PREPARE TO GET -X2M3, SAVING -X1M2 IN
1023 REP 404 LAST 1117	7445	52 155 1		DXCH	MPAC	MPAC +5.
1024 REP 405 LAST 1117	7446	52 162 0		DXCH	MPAC +5	
1025 REP 13 LAST 1117	7447	0 7056 0		TC	DMPSUB	
1026	7450	0 0006 1		EXTEND		
1027 REP 33 LAST 1117	7451	3 0123 1		DCA	VBUF	GET X2M1, SAVING -X2M3 IN VBUF +4.
1028 REP 406 LAST 1117	7452	52 155 1		DXCH	MPAC	
1029 REP 34 LAST 1117	7453	52 127 1		DXCH	VBUF +4	
1030 REP 14 LAST 1117	7454	0 7056 0		TC	DMPSUB	
1031 REP 56 LAST 1117	7455	3 4711 1		CAP	TWO	ADVANCE ADDRWD TO X3.
1032 REP 61 LAST 1117	7456	28 116 0		ADS	ADDRWD	
1033	7457	0 0006 1		EXTEND		
1034 REP 35 LAST 1117	7460	4 0123 0		DCS	VBUF	GET -X3M1, ADDING X2M1 TO MPAC +5 TO
1035 REP 407 LAST 1117	7461	52 155 1		DXCH	MPAC	COMPLETE THE Z COMPONENT OF THE ANSWER.
1036 REP 408 LAST 1117	7462	20 162 0		DAS	MPAC +5	
1037	7463	0 0006 1		EXTEND		
1038 REP 3 LAST 1103	7464	1 7466 0		BZF	+2	
1039 REP 3 LAST 1103	7465	0 6760 0		TC	OVERPLNZ	
1040 REP 15 LAST 1117	7466	0 7056 0		TC	DMPSUB	
1041 REP 38 LAST 1117	7467	52 125 0		DXCH	VBUF +2	MOVE X1M3 TO MPAC +3 SETTING UP FOR X3M2
1042 REP 409 LAST 1117	7470	52 160 1		DXCH	MPAC +3	AND ADD -X3M1 TO MPAC +3 TO COMPLETE THE
1043 REP 410 LAST 1117	7471	52 155 1		DXCH	MPAC	Y COMPONENT OF THE RESULT.
1044 REP 411 LAST 1117	7472	20 160 1		DAS	MPAC +3	
1045	7473	0 0006 1		EXTEND		
1046	7474	1 7476 1		BZF	+2	

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1047	REP 3 LAST 1103	7475 0 6763 0	TC	OVERLAY	
1048	REP 16 LAST 1117	7476 0 7056 0	TC	DMPSUB	
1049	REP 37 LAST 1117	7477 52 127 1	DXCH	VBUP +4	
1050	REP 4 LAST 1104	7500 1 6747 1	TOP	ENDVXV	GO ADD -X2M3 TO X3M2 TO COMPLETE THE X COMPONENT (TAIL END OF DAD).

R1051 THE MPACVBUP SUBROUTINE SAVES THE VECTOR IN MPAC IN VBUP WITHOUT Clobbering MPAC.

1053		7501 0 0006 1	MPACVBUP	EXTEND	CALLED BY MMV, VXM, AND UNIT.	
1054	REP 412 LAST 1117	7502 3 0155 0	DCA	MPAC		
1055	REP 38 LAST 1118	7503 52 123 0	DXCH	VBUP		
1056		7504 0 0006 1		EXTEND		
1057	REP 413 LAST 1118	7505 3 0160 0	DCA	MPAC +3		
1058	REP 39 LAST 1118	7506 52 125 0	DXCH	VBUP +2		
1059		7507 0 0006 1		EXTEND		
1060	REP 414 LAST 1118	7510 3 0162 1	DCA	MPAC +5		
1061	REP 40 LAST 1118	7511 52 127 1	DXCH	VBUP +4		
1062	REP 252 LAST 1112	7512 0 0002 0	TC	Q	RETURN TO CALLER.	
R1063					DOUBLE PRECISION SIGN AGREE ROUTINE. ARRIVE WITH INPUT IN A+L. OUTPUT IS IN A + L.	
1065	REP 296 LAST 1111	7513 10 000 0	ALSIGNAG	CCS	A	TEST UPPER PART.
1066	REP 1 LAST 1118	7514 1 7520 0	TC	UPPOS		IT IS POSITIVE
1067	REP 253 LAST 1118	7515 0 0002 0	TC	Q		ZERO
1068	REP 1 LAST 1118	7516 1 7530 1	TC	UPNEG		NEGATIVE
1069	REP 254 LAST 1118	7517 0 0002 0	TC	Q		ZERO
1070	REP 176 LAST 1112	7520 56 001 0	UPPOS	XCH	L	SAVE DECREMENTED UPPER PART.
1071	REP 9 LAST 1062	7521 6 4675 1	AD	HALP		
1072	REP 10 LAST 1118	7522 6 4675 1	AD	HALP		
1073	REP 297 LAST 1118	7523 54 000 0	TS	A		SKIPS ON OVERFLOW
1074		7524 1 7526 0	TC	+2		
1075	REP 177 LAST 1118	7525 24 001 0	INCR	L		RESTORE UPPER TO ROIGINAL VALUE
1076	REP 178 LAST 1118	7526 56 001 0	XCH	L		SWAP A + L BACK.
1077	REP 255 LAST 1118	7527 0 0002 0	TC	Q		
1078	REP 179 LAST 1118	7530 56 001 0	UPNEG	XCH	L	SAVE COMPLEMENTED + DECREMENTED UPPER PT
1079	REP 11 LAST 1033	7531 6 4674 0	AD	NEGMAX		
1080	REP 24 LAST 1089	7532 6 7716 0	AD	NEGONE		
1081	REP 298 LAST 1118	7533 54 000 0	TS	A		
1082		7534 1 7536 1	TC	+2		DONT INCREMENT IF NO OVERFLOW.
1083	REP 180 LAST 1118	7535 24 001 0	INCR	L		
1084	REP 181 LAST 1118	7536 56 001 0	XCH	L		
1085		7537 4 0000 0	COM			MAKE NEGATIVE AGAIN.
1086	REP 256 LAST 1118	7540 0 0002 0	TC	Q		

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## P1067 INTERPRETIVE INSTRUCTIONS WHOSE EXECUTION CONSISTS OF PRINCIPALLY CALLING SUBROUTINES.

1069	REF	17	LAST	1116	7541	0	7056	0	DMP1	TC	DMPSUB	DMP INSTRUCTION.
1090	REF	22	LAST	1115	7542	1	6030	0		TCP	DANZIG	
1091	REF	16	LAST	1119	7543	0	7056	0	DMPR	TC	DMPSUB	
1092	REF	1			7544	0	7106	1		TC	ROUNDSUB	+1 (C(A) = +0).
1093	REF	23	LAST	1119	7545	1	6030	0		TCP	DANZIG	
1094					7546	0	0006	1	DDV	EXTEND		
1095	REF	62	LAST	1117	7547	5	0116	1		INDEX	ADDRMD	MOVE DIVIDEND INTO BUF.
1096					7550	3	0001	0		DCA	0	
1097	REF	2	LAST	1086	7551	1	7556	1		TCP	DDV	+4
1098					7552	0	0006	1	BDDV	EXTEND		
1099	REF	63	LAST	1119	7553	5	0116	1		INDEX	ADDRMD	MOVE DIVISOR INTO MPAC SAVING MPAC, THE DIVIDEND, IN BUF.
1100					7554	3	0001	0		DCA	0	
1101	REF	415	LAST	1118	7555	52	155	1		DXCH	MPAC	
1102	REF	53	LAST	1108	7556	52	131	0	+4	DXCH	BUP	
1103	REF	216	LAST	1113	7557	3	4714	1		CAP	ZERO	DIVIDE ROUTINES IN BANK 0.
1104	REF	20	LAST	1099	7560	54	004	1		TS	FBANK	
1105	REF	1			7561	1	2353	1		TCP	DDV/BDDV	
1106	REF	64	LAST	1119	7562	3	0116	1	SETPD	CA	ADDRMD	MUST SET TO WORK AREA, OR FBANK TROUBLE.
1107	REF	12	LAST	1096	7563	54	166	1		TS	PUSHLOC	
1108	REF	1			7564	1	6032	1		TCP	NOIBNKS	NO FBANK SWITCH REQUIRED.
1109	REF	219	LAST	1119	7565	3	4714	1	TSLC	CAP	ZERO	SHIFTING ROUTINES LOCATED IN BANK 00.
1110	REF	21	LAST	1119	7566	54	004	1		TS	FBANK	
1111	REF	1			7567	1	2172	0		TCP	TSLC2	
1112	REF	7	LAST	1076	7570	3	6043	0	GSHIFT	CAP	LOWT	
1113	REF	22	LAST	1119	7571	54	004	1		TS	FBANK	
1114	REF	1			7572	1	2214	0		TCP	GSHIFT	USED AS MASK AT GENSHIFT. THIS PROCESSES ANY SHIFT INSTRUCTION (EXCEPT TSLC) WITH AN ADDRESS (ROUTINES IN BANK 0).

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P1115 THE FOLLOWING IS THE PROLOGUE TO V/SC. IF THE PRESENT MODE IS VECTOR, IT SAVES THE SCALAR AT X IN BUP  
 R1117 AND CALLS THE V/SC ROUTINE IN BANK 0. IF THE PRESENT MODE IS SCALAR, IT MOVES THE VECTOR AT X INTO MPAC, SAVING  
 R1119 THE SCALAR IN BUP BEFORE CALLING THE V/SC ROUTINE IN BANK 0.  
 1120 REP 17 LAST 1115 7573 10 163 1 V/SC CCS MODE  
 1121 REP 1 7574 1 7605 1 TCP DV/SC MOVE VECTOR INTO MPAC.  
 1122 REP 2 LAST 1120 7575 1 7605 1 TCP DV/SC  
 1123 7576 0 0006 1 VV/SC EXTEND  
 1124 REP 65 LAST 1119 7577 5 0116 1 INDEX ADDRMD  
 1125 7600 3 0001 0 DCA 0  
 1126 REP 54 LAST 1119 7601 52 131 0 V/SC1 DXCH BUP  
 1127 REP 220 LAST 1119 7602 3 4714 1 CAP ZERO  
 1128 REP 23 LAST 1119 7603 54 004 1 TS FBANK  
 1129 REP 1 7604 1 2654 0 TCP V/SC2  
 IN BOTH CASES, VECTOR IS NOW IN MPAC AND SCALAR IN BUP.  
 1130 7605 0 0006 1 DV/SC EXTEND  
 1131 REP 66 LAST 1120 7606 5 0116 1 INDEX ADDRMD  
 1132 7607 3 0003 1 DCA 2  
 1133 REP 416 LAST 1119 7610 52 160 1 DXCH MPAC +3  
 1134 7611 0 0006 1 EXTEND  
 1135 REP 67 LAST 1120 7612 5 0116 1 INDEX ADDRMD  
 1136 7613 3 0005 1 DCA 4  
 1137 REP 417 LAST 1120 7614 52 162 0 DXCH MPAC +5  
 1138 REP 135 LAST 1094 7615 4 4712 0 CS ONE  
 1139 REP 18 LAST 1120 7616 54 163 1 TS MODE CHANGE MODE TO VECTOR.  
 1140 7617 0 0006 1 EXTEND  
 1141 REP 68 LAST 1120 7620 5 0116 1 INDEX ADDRMD  
 1142 7621 3 0001 0 DCA 0  
 1143 REP 418 LAST 1120 7622 52 155 1 DXCH MPAC  
 1144 REP 1 7623 1 7601 0 TCP V/SC1 FINISH PROLOGUE AT COMMON SECTION.

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## P1145 SIGN AND COMPLEMENT INSTRUCTIONS.

1146	REP	89	LAST	1120	7624	50 116 1	SIGN	INDEX	ADDRWD	CALL COMP INSTRUCTION IF WORD AT X IS NEGATIVE NON-ZERO.
1147					7625	10 000 0		CCS	0	
1148	REP	24	LAST	1119	7626	1 6030 0		TCP	DANZIG	
1149					7627	1 7631 0		TCP	+2	
1150	REP	2	LAST	1068	7630	1 7637 0		TCP	COMP	DO THE COMPLEMENT.
1151	REP	70	LAST	1121	7631	50 116 1		INDEX	ADDRWD	
1152					7632	10 001 1	CCSL	CCS	1	
1153	REP	25	LAST	1121	7633	1 6030 0		TCP	DANZIG	
1154	REP	26	LAST	1121	7634	1 6030 0		TCP	DANZIG	
1155	REP	3	LAST	1121	7635	1 7637 0		TCP	COMP	
1156	REP	27	LAST	1121	7636	1 6030 0		TCP	DANZIG	
1157					7637	0 0006 1	COMP	EXTEND		COMPLEMENT DP MPAC IN EVERY CASE.
1158	REP	419	LAST	1120	7640	4 0155 1		DCS	MPAC	
1159	REP	420	LAST	1121	7641	52 155 1		DXCH	MPAC	
1160	REP	19	LAST	1120	7642	10 163 1		CCS	MODE	
1161	REP	1	LAST	1120	7643	1 7654 0		TCP	DCOMP	
1162	REP	2	LAST	1121	7644	1 7654 0		TCP	DCOMP	EITHER COMPLEMENT MPAC +3 OR THE REST OF THE VECTOR ACCUMULATOR.
1163					7645	0 0006 1		EXTEND		VECTOR COMPLEMENT.
1164	REP	421	LAST	1121	7646	4 0160 1		DCS	MPAC +3	
1165	REP	422	LAST	1121	7647	52 160 1		DXCH	MPAC +3	
1166					7650	0 0006 1		EXTEND		
1167	REP	423	LAST	1121	7651	4 0162 0		DCS	MPAC +5	
1168	REP	424	LAST	1121	7652	52 162 0		DXCH	MPAC +5	
1169	REP	28	LAST	1121	7653	1 6030 0		TCP	DANZIG	
1170	REP	425	LAST	1121	7654	4 0156 1	DCOMP	CS	MPAC +2	
1171	REP	426	LAST	1121	7655	54 156 1		TS	MPAC +2	
1172	REP	29	LAST	1121	7656	1 6030 0		TCP	DANZIG	

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P1173 THE FOLLOWING SHIFT CODES REQUIRE NO ADDRESS WORD

R1174 1. SR1 TO SR4 SCALAR SHIFT RIGHT.  
 R1175 2. SR1R TO SR4R SCALAR SHIFT RIGHT AND ROUND.  
 R1176 3. SL1 TO SL4 SCALAR SHIFT LEFT.  
 R1177 4. SL1R TO SL4R SCALAR SHIFT LEFT AND ROUND.

R1178 5. VSR1 TO VSR8 VECTOR SHIFT RIGHT (ALWAYS ROUNDS).  
 R1179 6. VSL1 TO VSL8 VECTOR SHIFT LEFT (NEVER ROUNDS).

R1180 THE FOLLOWING CODES REQUIRE AN ADDRESS WHICH MAY BE INDEXED\*

R1181 1. SR SCALAR SHIFT RIGHT.  
 R1182 2. SRR SCALAR SHIFT RIGHT AND ROUND.  
 R1183 3. SL SCALAR SHIFT LEFT.  
 R1184 4. SLR SCALAR SHIFT LEFT AND ROUND.

R1185 5. VSR VECTOR SHIFT RIGHT.  
 R1186 6. VSL VECTOR SHIFT LEFT.

R1187 \* IF THE ADDRESS IS INDEXED, AND THE INDEX MODIFICATION RESULTS IN A NEGATIVE SHIFT COUNT, A SHIFT OF THE  
 R1189 ABSOLUTE VALUE OF THE COUNT IS DONE IN THE OPPOSITE DIRECTION.

1190 00,2017 BANK 00

1191	REF	2 LAST 1088 TO 1089*	15	15*	COUNT	00/INTER	
1192	REF 36	LAST 1113	00,2017	3 6211 0	SHORIT	CAP	SIX
1193	REF 29	LAST 1093	00,2020	7 0020 1		MASK	CYR
1194	REF 20	LAST 1081	00,2021	54 021 0		TS	SR
1195	REF 30	LAST 1122	00,2022	10 020 1		CCS	CYR
1196	REF 1		00,2023	1 2101 1		TOP	TSSL
1197			00,2024	00024 1	SRDDV	DEC	20
1198	REF 21	LAST 1122	00,2025	50 021 1	TSSR	INDEX	SR
1199	REF 63	LAST 1010	00,2026	3 4675 1		CAP	BIT14
1200	REF 13	LAST 1111	00,2027	54 135 1		TS	MPTEMP
1201	REF 31	LAST 1122	00,2030	10 020 1		CCS	CYR
1202	REF 1		00,2031	0 2050 0	RIGHTR	TC	MPACSRND
1203	REF 4	LAST 1113	00,2032	1 6027 0		TOP	NEWMODE
1204	REF 14	LAST 1122	00,2033	3 0135 0	MPACSHR	CA	MPTEMP
1205			00,2034	0 0006 1	EXTEND		
1206	REF 427	LAST 1121	00,2035	7 0156 1		MP	MPAC +2
1207	REF 428	LAST 1122	00,2036	54 158 1	+3	TS	MPAC +2
1208	REF 15	LAST 1122	00,2037	3 0135 0		CA	MPTEMP
1209			00,2049	0 0006 1	EXTEND		

SCALAR SHORT SHIFTS COME HERE. THE SHIFT COUNT-1 IS NOW IN BITS 2-3 OF CYR. THE ROUNDING BIT IS IN BIT1 AT THIS POINT.

SEE IF RIGHT OR LEFT SHIFT DESIRED.  
 SHIFT LEFT.

MPTEMP SETTING FOR SR BEFORE DDV.

GET SHIFTING BIT.

SEE IF A ROUND IS DESIRED.  
 YES - SHIFT RIGHT AND ROUND.  
 SET MODE TO DP (C(A) = 0).  
 DO A TRIPLE PRECISION SHIFT RIGHT.

(EXIT FROM SORT AND ABVAL).

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1210	REP 429	LAST 1122	00,2041	7 0154 0	MP	MPAC
1211	REP 430	LAST 1123	00,2042	52 155 1	DXCH	MPAC
1212	REP 16	LAST 1122	00,2043	3 0135 0	CA	MPTEMP
1213			00,2044	0 0008 1	EXTEND	
1214	REP 162	LAST 1118	00,2045	7 0001 1	MP	L
1215	REP 431	LAST 1123	00,2046	20 156 1	DAS	MPAC +1
1216	REP 30	LAST 1121	00,2047	1 6030 0	TCP	DANZIG

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SHIFT MAJOR PART INTO A,L, AND PLACE IN  
MPAC,+1.ORIGINAL C(MPAC +1).  
GUARANTEED NO OVERFLOW.

## R1217 MPAC SHIFT RIGHT AND ROUND SUBROUTINES.

1218	REP 432	LAST 1123	00,2050	3 0156 0	MPACSRND	CA	MPAC +2
1219			00,2051	0 0006 1		EXTEND	
1220	REP 17	LAST 1123	00,2052	7 0135 1	MP	MPTEMP	
1221	REP 433	LAST 1123	00,2053	56 155 0	XCH	MPAC +1	
1222			00,2054	0 0006 1	EXTEND		
1223	REP 18	LAST 1123	00,2055	7 0135 1	MP	MPTEMP	
1224	REP 434	LAST 1123	00,2056	56 155 0	XCH	MPAC +1	
1225	REP 183	LAST 1123	00,2057	6 0001 0	AD	L	

WE HAVE TO DO ALL THREE MULTIPLIES SINCE  
MPAC +1 AND MPAC +2 MIGHT HAVE SIGN  
DISAGREEMENT WITH A SHIFT RIGHT OF 1.

TRIAL MINOR PART.

1226			00,2060	6 0000 1	VSHR2	DOUBLE	
1227	REP 435	LAST 1123	00,2061	54 156 1	TS	MPAC +2	
1228			00,2062	1 2064 0	TCP	+2	
1229	REP 436	LAST 1123	00,2063	28 155 1	ADS	MPAC +1	

(FINISH VECTOR COMPONENT SHIFT RIGHT  
AND ROUND.

GUARANTEED NO OVERFLOW.

1230	REP 221	LAST 1120	00,2064	3 4714 1	CAP	ZERO
1231	REP 437	LAST 1123	00,2065	54 156 1	TS	MPAC +2
1232	REP 438	LAST 1123	00,2066	56 154 1	XCH	MPAC
1233			00,2067	0 0008 1	EXTEND	
1234	REP 19	LAST 1123	00,2070	7 0135 1	MP	MPTEMP
1235	REP 439	LAST 1123	00,2071	20 155 1	DAS	MPAC
1236	REP 257	LAST 1118	00,2072	0 0002 0	TC	Q

SETTING TO ZERO SO FOLLOWING DAS WORKS.

AGAIN NO OVERFLOW.

1237	REP 20	LAST 1123	00,2073	3 0135 0	VSHRRND	CA	MPTEMP
1238			00,2074	0 0008 1		EXTEND	
1239	REP 440	LAST 1123	00,2075	7 0155 1	MP	MPAC +1	
1240	REP 441	LAST 1123	00,2076	54 155 1	TS	MPAC +1	
1241	REP 184	LAST 1123	00,2077	56 001 0	XCH	L	
1242	REP 1		00,2100	1 2060 1	TCP	VSHR2	

ENTRY TO SHIFT RIGHT AND ROUND MPAC WHEN  
MPAC CONTAINS A VECTOR COMPONENT.

GO ADD ONE IF NECESSARY AND FINISH.

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P1243 ROUTINE FOR SHORT SCALAR SHIFT LEFT (AND MAYBE ROUND).

1244	RESP	22	LAST	1122	00,2101	3 0021 1	TSSL	CA	SR	
1245	RESP	21	LAST	1123	00,2102	54 135 1	+1	TS	MPTEMP	GET SHIFT COUNT FOR SR.
1246					00,2103	0 0008 1	+2	EXTEND		
1247	RESP	442	LAST	1123	00,2104	3 0158 0		DCA	MPAC +1	ENTRY HERE FROM SL FOR SCALARS.
1248	RESP	443	LAST	1124	00,2105	20 158 1		DAS	MPAC +1	SHIFTING LEFT ONE PLACE AT A TIME IS
1249	RESP	444	LAST	1124	00,2106	6 0154 1		AD	MPAC	FASTER THAN DOING THE WHOLE SHIFT WITH
1250	RESP	445	LAST	1124	00,2107	6 0154 1		AD	MPAC	MULTIPLIES ASSUMING THAT FREQUENCY OF
1251	RESP	446	LAST	1124	00,2110	54 154 0		TS	MPAC	SHIFT COUNTS GOES DOWN RAPIDLY AS A
1252					00,2111	1 2113 1		TCP	+2	FUNCTION OF THEIR MAGNITUDE.
1253	RESP	4	LAST	1108	00,2112	54 121 1		TS	O/PIND	
A1254										OVERFLOW. (LEAVES OVERFLOW-CORRECTED
1255	RESP	22	LAST	1124	00,2113	10 135 1		CCS	MPTEMP	RESULT ANYWAY).
1256	RESP	2	LAST	1122	00,2114	1 2102 1		TCP	TSSL +1	LOOP ON DECREMENTED SHIFT COUNT.
1257	RESP	32	LAST	1122	00,2115	10 020 1		CCS	CYR	
1258	RESP	2	LAST	1119	00,2116	0 7105 1	ROUND	TC	ROUNDSUB	SEE IF ROUND WANTED.
1259	RESP	31	LAST	1123	00,2117	1 6030 0		TCP	DANZIG	YES - ROUND AND EXIT.
1260	RESP	32	LAST	1124	00,2120	1 6030 0		TCP	DANZIG	SL LEAVES A ZERO IN CYR FOR NO ROUND.
										NO - EXIT IMMEDIATELY.

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## P1261 VECTOR SHIFTING ROUTINES.

1262	REP	3	LAST	728	00,2121	3 4716 0	SHRTIV	CAF	LOW3	SAVE 3 BIT SHIFT COUNT - 1 WITHOUT EDITING CYR.
1263	REP	33	LAST	1124	00,2122	7 0020 1		MASK	CYR	
1264	REP	23	LAST	1124	00,2123	54 135 1		TS	MPTEMP	
1265	REP	34	LAST	1125	00,2124	10 020 1		CCS	CYR	
1266	REP	1			00,2125	1 2145 1		TCP	VSSL	
1267					00,2126	00176 1	OCT176	OCT	176	USED IN PROCESSED SHIFTS WITH - COUNT.
1268	REP	24	LAST	1125	00,2127	50 135 0	VSSR	INDEX	MPTEMP	(ENTRY FROM SR). PICK UP SHIFTING BIT.
1269	REP	64	LAST	1122	00,2130	3 4675 1		CAP	BIT14	MPTEMP CONTAINS THE SHIFT COUNT - 1.
1270	REP	25	LAST	1125	00,2131	54 135 1		TS	MPTEMP	
1271	REP	1			00,2132	0 2073 1		TC	VSHRRND	SHIFT X COMPONENT.
1272	REP	447	LAST	1124	00,2133	52 155 1		DXCH	MPAC	SWAP X AND Y COMPONENTS.
1273	REP	448	LAST	1125	00,2134	52 180 1		DXCH	MPAC +3	
1274	REP	449	LAST	1125	00,2135	52 155 1		DXCH	MPAC	
1275	REP	2	LAST	1125	00,2136	0 2073 1		TC	VSHRRND	SHIFT Y COMPONENT.
1276	REP	450	LAST	1125	00,2137	52 155 1		DXCH	MPAC	SWAP Y AND Z COMPONENTS.
1277	REP	451	LAST	1125	00,2140	52 182 0		DXCH	MPAC +5	
1278	REP	452	LAST	1125	00,2141	52 155 1		DXCH	MPAC	
1279	REP	3	LAST	1125	00,2142	0 2073 1		TC	VSHRRND	SHIFT Z COMPONENT.
1280	REP	1			00,2143	1 7387 0		TOP	VROTATEX	RESTORE COMPONENTS TO PROPER PLACES.

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P1281 VECTOR SHIFT LEFT - DONE ONE PLACE AT A TIME.

1282	REP 26 LAST 1125	00,2144 54 135 1 -1	TS	MPTEMP	SHIFTING LOOP.
1283		00,2145 0 0006 1	VSSL	EXTEND	
1284	REP 453 LAST 1125	00,2146 3 0155 0		DCA	MPAC
1285	REP 454 LAST 1126	00,2147 20 155 1		DAS	MPAC
1286		00,2150 0 0006 1		EXTEND	
1287		00,2151 1 2153 0		B2P	+2
1288	REP 3 LAST 1108	00,2152 0 6766 0		TC	OVERFLOW
1289		00,2153 0 0006 1		EXTEND	
1290	REP 455 LAST 1126	00,2154 3 0160 0		DCA	MPAC
1291	REP 456 LAST 1126	00,2155 20 160 1		DAS	MPAC +3
1292		00,2156 0 0006 1		EXTEND	
1293		00,2157 1 2161 1		B2P	+2
1294	REP 4 LAST 1118	00,2160 0 6763 0		TC	OVERFLW
1295		00,2161 0 0006 1		EXTEND	
1296	REP 457 LAST 1126	00,2162 3 0162 1		DCA	MPAC +5
1297	REP 458 LAST 1126	00,2163 20 162 0		DAS	MPAC +5
1298		00,2164 0 0006 1		EXTEND	
1299		00,2165 1 2167 1		B2P	+2
1300	REP 4 LAST 1117	00,2166 0 6760 0		TC	OVERFLW
1301	REP 27 LAST 1126	00,2167 10 135 1	CCS	MPTEMP	LOOP ON DECREMENTED SHIFT COUNTER.
1302	REP 2 LAST 1125	00,2170 1 2144 0	TCP	VSSL -1	
1303	REP 33 LAST 1124	00,2171 1 6030 0	TCP	DANZIG	EXIT.

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P1304 TSLC - TRIPLE SHIFT LEFT AND COUNT. SHIFTS MPAC LEFT UNTIL GREATER THAN .5 IN MAGNITUDE, LEAVING  
 R1306 THE COMPLEMENT OF THE NUMBER OF SHIFTS REQUIRED IN X.

1307	REP	28	LAST	1128	00,2172	54 135 1	TSLC2	TS	MPTEMP	START BY ZEROING SHIFT COUNT (IN A NOW).
1308	REP	2	LAST	1111	00,2173	0 6672 1		TC	BRANCH	EXIT WITH NO SHIFTING IF ARGUMENT ZERO.
1309					00,2174	1 2176 1		TCP	+2	
1310	REP	1			00,2175	1 2212 0		TCP	ENDTSLC	STORES ZERO SHIFT COUNT IN THIS CASE.
1311	REP	8	LAST	683	00,2176	0 7226 0		TC	TPAGREE	MAY CAUSE UPSHIFT OF ONE EXTRA PLACE.
1312	REP	459	LAST	1126	00,2177	3 0154 1		CA	MPAC	BEGIN NORMALIZATION LOOP.
1313	REP	1			00,2200	1 2207 1		TCP	TSLCTEST	
1314	REP	29	LAST	1127	00,2201	24 135 0	TSLCLOOP	INCR	MPTEMP	INCREMENT SHIFT COUNTER.
1315					00,2202	0 0006 1			EXTEND	
1316	REP	460	LAST	1127	00,2203	3 0156 0		DCA	MPAC +1	
1317	REP	461	LAST	1127	00,2204	20 156 1		DAS	MPAC +1	
1318	REP	462	LAST	1127	00,2205	8 0154 1		AD	MPAC	
1319	REP	463	LAST	1127	00,2206	28 154 0		ADS	MPAC	
1320					00,2207	8 0000 1	TSLCTEST	DOUBLE		SEE IF (ANOTHER) SHIFT IS REQUIRED.
1321					00,2210	54 000 0		O/SK		
1322	REP	1			00,2211	1 2201 1		TCP	TSLCLOOP	YES - INCREMENT COUNT AND SHIFT AGAIN.
1323	REP	30	LAST	1127	00,2212	4 0135 1	ENDTSLC	CS	MPTEMP	
1324	REP	1			00,2213	1 6572 0		TCP	STORE1	STORE SHIFT COUNT AND RETURN TO DANZIG.

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P1325 THE FOLLOWING ROUTINES PROCESSES THE GENERAL SHIFT INSTRUCTIONS SR, SRR, SL, AND SLR.  
 B1327 THE GIVEN ADDRESS IS DECODED AS FOLLOWS'

B1328 BITS 1-7 SHIFT COUNT (SUBADDRESS) LESS THAN 125 DECIMAL.  
 B1329 BIT 8 PSEUDO SIGN BIT (DETECTS CHANGE IN SIGN IN INDEXED SHIFTS).  
 B1331 BIT 9 0 FOR LEFT SHIFT, AND 1 FOR RIGHT SHIFT.  
 B1332 BIT 10 1 FOR TERMINAL ROUND ON SCALAR SHIFTS, 0 OTHERWISE.  
 B1333 BITS 11-13 0.  
 B1334 BIT 14 1.  
 B1335 BIT 15 0.

B1336 THE ABOVE ENCODING IS DONE BY THE YUL SYSTEM.

1337 REP 71 LAST 1121	00,2214	7 0116 0	GENSHIFT MASK	ADDRMD	GET SHIFT COUNT, TESTING FOR ZERO. (ARRIVES WITH C(A) = LOW?).
1338 REP 299 LAST 1118	00,2215	10 000 0	CCS	A	IF NON-ZERO, PROCEED WITH DECREMENTED CT
1339 REP 1	00,2216	1 2224 0	TCP	GENSHFT2	
1340 REP 33 LAST 701	00,2217	3 4701 0	CAP	BIT10	ZERO SHIFT COUNT. NO SHIFTS NEEDED BUT
1341 REP 72 LAST 1128	00,2220	7 0116 0	MASK	ADDRMD	WE MIGHT HAVE TO ROUND MPAC ON SLR AND
1342 REP 300 LAST 1128	00,2221	10 000 0	CCS	A	SLR (SCALAR ONLY).
1343 REP 3 LAST 1124	00,2222	0 7105 1	TC	ROUNDSub	
1344 REP 34 LAST 1126	00,2223	1 8030 0	TCP	DANZIG	
1345 REP 31 LAST 1127	00,2224	54 135 1	GENSHFT2	TS	DECREMENTED SHIFT COUNT TO MPTEMP.
1346 REP 26 LAST 1075	00,2225	3 4703 1	CAP	BIT8	TEST MEANING OF LOW SEVEN BIT COUNT IN
1347	00,2226	0 0006 1	EXTEND		MPTEMP NOW.
1348 REP 73 LAST 1128	00,2227	7 0116 0	MP	ADDRMD	JUMPS ON SHIFT DIRECTION (BIT8) AND
1349 REP 1	00,2230	7 8214 1	MASK	LOW2	ORIGINAL SHIFT DIRECTION (BIT 9).
1350 REP 301 LAST 1128	00,2231	50 000 1	INDEX	A	NEGATIVE SHIFT COUNT FOR SL OR SLR.
1351	00,2232	1 2233 0	TCP	+1	SL OR SLR.
1352 REP 1	00,2233	1 2332 0	TCP	RIGHT-	NEGATIVE SHIFT COUNT WITH SR OR SRR.
1353 REP 1	00,2234	1 2342 1	TCP	LEFT-	
1354 REP 1	00,2235	1 2338 1	TCP	LEFT-	

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## P1355 GENERAL SHIFT RIGHT.

1356	NEP	20	LAST	1121	00,2236	10 163 1	RIGHT	CCS	MODE	SEE IF VECTOR OR SCALAR.
1357	NEP	1			00,2237	1 2277 0		TCP	GNSCR	
1358	NEP	2	LAST	1129	00,2240	1 2277 0		TCP	GNSCR	
1359	NEP	32	LAST	1128	00,2241	3 0135 0		CA	MPTEMP	SEE IF SHIFT COUNT LESS THAN 14D.
1360	NEP	1			00,2242	6 3730 0	VRIGHT2	AD	NEG12	
1361					00,2243	0 0006 1		EXTEND		
1362	NEP	1			00,2244	6 2127 1		BZMF	VSSR	IF SO, BRANCH AND SHIFT IMMEDIATELY.
1363	NEP	25	LAST	1118	00,2245	6 7716 0		AD	NEGONS	
1364	NEP	33	LAST	1129	00,2246	54 135 1		TS	MPTEMP	
1365	NEP	222	LAST	1123	00,2247	3 4714 1		CAP	ZERO	
1366	NEP	185	LAST	1123	00,2250	54 001 1		TS	L	
1367	NEP	464	LAST	1127	00,2251	56 154 1		XCH	MPAC	
1368	NEP	465	LAST	1129	00,2252	56 155 0		XCH	MPAC +1	
1369	NEP	1			00,2253	0 2272 1		TC	SETROUND	X COMPONENT NOW SHIFTED, SO MAKE UP THE ROUNDING QUANTITY (0 IN A AND 0 OR +-1 IN L).
1370	NEP	466	LAST	1129	00,2254	20 155 1		DAS	MPAC	REPEAT THE ABOVE PROCESS FOR Y AND Z.
A1371										NO OVERFLOW ON THESE ADDS.
1372	NEP	467	LAST	1129	00,2255	56 157 1		XCH	MPAC +3	
1373	NEP	468	LAST	1129	00,2256	56 160 0		XCH	MPAC +4	
1374	NEP	2	LAST	1129	00,2257	0 2272 1		TC	SETROUND	
1375	NEP	469	LAST	1129	00,2260	20 160 1		DAS	MPAC +3	
1376	NEP	470	LAST	1129	00,2261	56 161 1		XCH	MPAC +5	
1377	NEP	471	LAST	1129	00,2262	56 162 1		XCH	MPAC +6	
1378	NEP	3	LAST	1129	00,2263	0 2272 1		TC	SETROUND	
1379	NEP	472	LAST	1129	00,2264	20 162 0		DAS	MPAC +5	
1380	NEP	34	LAST	1129	00,2265	10 135 1		CCS	MPTEMP	SEE IF DONE, DOING FINAL DECREMENT.
1381	NEP	35	LAST	1129	00,2266	54 135 1		TS	MPTEMP	
1382	NEP	1			00,2267	1 2242 0		TCP	VRIGHT2	
1383					00,2270	04604 1	BIASLO	DEC	.2974 B-1	SORT CONSTANT
1384	NEP	35	LAST	1128	00,2271	1 6030 0		TCP	DANZIG	
1385					00,2272	6 0000 1	SETROUND	DOUBLE		MAKES UP ROUNDING QUANTITY FROM ARRIVING C(A). L IS ZERO INITIALLY.
1386	NEP	473	LAST	1129	00,2273	54 156 1		TS	MPAC +2	
1387	NEP	223	LAST	1129	00,2274	3 4714 1		CAP	ZERO	
1388	NEP	186	LAST	1129	00,2275	56 001 0		XCH	L	
1389	NEP	258	LAST	1123	00,2276	0 0002 0		TC	Q	RETURN AND DO THE DAS, RESETTING L TO 0.

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P1390 PROCESS SR AND SRR FOR SCALARS.

1391	REP	36	LAST	1129	00,2277	3 0135 0	GENSOR	CA	MPTEMP		
1392	REP	2	LAST	1129	00,2300	6 3730 0	+1	AD	NEG12		
1393					00,2301	0 0008 1		EXTEND			
1394	REP	1			00,2302	6 2322 0		B2NP	DOSSHPT		
1395	REP	26	LAST	1129	00,2303	6 7716 0	+4	AD	NEGONE		SEE IF THE ORIGINAL SHIFT COUNT WAS LESS THAN 14D.
1396	REP	37	LAST	1130	00,2304	54 135 1		TS	MPTEMP		
1397	REP	224	LAST	1129	00,2305	3 4714 1		CAP	ZERO		
1398	REP	474	LAST	1129	00,2306	56 154 1		XCH	MPAC		
1399	REP	475	LAST	1130	00,2307	56 155 0		XCH	MPAC +1		
1400	REP	476	LAST	1130	00,2310	54 156 1		TS	MPAC +2		
1401	REP	36	LAST	1130	00,2311	10 135 1		CCS	MPTEMP		
1402	REP	39	LAST	1130	00,2312	54 135 1		TS	MPTEMP		
1403	REP	3	LAST	1129	00,2313	0 2300 0		TC	GENSOR +1		
1404					00,2314	22650 1	SLOPENI	DEC	.5884		
1405	REP	34	LAST	1128	00,2315	3 4701 0		CAP	BIT10		
1406	REP	74	LAST	1126	00,2316	7 0116 0		MASK	ADDRMD		
1407	REP	302	LAST	1126	00,2317	10 000 0		CCS	A		
1408	REP	4	LAST	1126	00,2320	0 7105 1		TC	ROUNDSUB		
1409	REP	36	LAST	1129	00,2321	1 6030 0		TCP	DANZIG		
1410	REP	40	LAST	1130	00,2322	50 135 0	DOSSHPT	INDEX	MPTEMP		
1411	REP	65	LAST	1125	00,2323	3 4675 1		CAP	BIT14		
1412	REP	41	LAST	1130	00,2324	54 135 1		TS	MPTEMP		
1413	REP	35	LAST	1130	00,2325	3 4701 0		CAP	BIT10		
1414	REP	75	LAST	1130	00,2326	7 0116 0		MASK	ADDRMD		
1415	REP	303	LAST	1130	00,2327	10 000 0		CCS	A		
1416	REP	1			00,2330	1 2031 0		TCP	RIGHTR		
1417	REP	1			00,2331	1 2033 1		TCP	MPACSHR		

DO THE SHIFT IMMEDIATELY IF SO.

IF NOT, DECREMENT SHIFT COUNT BY 14D AND SHIFT MPAC RIGHT 14 PLACES.

SEE IF FINISHED, DO FINAL DECREMENT.

SORT CONSTANT.  
FINISHED WITH SHIFT. SEE IF ROUND WANTED.

DO SO AND/OR EXIT.

PICK UP SHIFTING BIT.

SEE IF TERMINAL ROUND DESIRED.

YES.  
JUST SHIFT RIGHT.

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P1418 PROCESS THE RIGHT- (SL(R)) WITH A NEGATIVE COUNT, LEFT-, AND LEFT OPTIONS.

1420	REP	42	LAST	1130	00,2332	4 0135	1	RIGHT-	CS	MPTEMP	GET ABSOLUTE VALUE - 1 OF SHIFT COUNT
1421	REP	1			00,2333	6 2128	0		AD	OCT176	UNDERSTANDING THAT BIT8 (PSEUDO-SIGN)
1422	REP	43	LAST	1131	00,2334	54 135	1		TS	MPTEMP	WAS 1 INITIALLY.
1423	REP	1			00,2335	1 2236	0		TCP	RIGHT	DO NORMAL SHIFT RIGHT.
1424	REP	2	LAST	1131	00,2336	4 2128	1	LEFT-	CS	OCT176	SAME PROLOGUE TO LEFT FOR INDEXED RIGHT
1425	REP	44	LAST	1131	00,2337	6 0135	0		AD	MPTEMP	SHIFTS WHOSE NET SHIFT COUNT IS NEGATIVE
1426					00,2340	4 0000	0		COM		
1427	REP	45	LAST	1131	00,2341	54 135	1		TS	MPTEMP	
1428	REP	21	LAST	1129	00,2342	10 163	1	LEFT	CCS	MODE	SINCE LEFT SHIFTING IS DONE ONE PLACE AT
1429	REP	1			00,2343	1 2348	0		TCP	GENSCL	A TIME, NO COMPARISON WITH 14 NEED BE
1430	REP	2	LAST	1131	00,2344	1 2348	0		TCP	GENSCL	DONE. FOR SCALARS, SEE IF TERMINAL ROUND
1431	REP	3	LAST	1128	00,2345	1 2145	1		TCP	VSSL	DESIRED. FOR VECTORS, SHIFT IMMEDIATELY.
1432	REP	76	LAST	1130	00,2346	4 0118	0	GENSCL	CS	ADDRWD	PUT ROUNDING BIT (BIT 10 OF ADDRWD) INTO
1433					00,2347	0 0008	1		EXTEND	BIT 15 OF CYR WHERE THE ROUNDING BIT OF	
1434	REP	43	LAST	1034	00,2350	7 4705	0		MP	BIT8	A SHORT SHIFT LEFT WOULD BE
1435	REP	35	LAST	1125	00,2351	54 020	1		TS	CYR	
1436	REP	3	LAST	1124	00,2352	1 2103	0		TCP	TSSL +2	DO THE SHIFT.

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P1437 SCALAR DIVISION INSTRUCTIONS, DDV AND BDDV, ARE EXECUTED HERE. AT THIS POINT, THE DIVIDEND IS IN MPAC  
 R1439 AND THE DIVISOR IN BUP.

1440	REP 136	LAST 1120	00,2353 4 4712 0	DDV/BDDV CS	ONE	INITIALIZATION.	
1441	REP 1		00,2354 54 136 1	TS	DVSIGN	+1 FOR POSITIVE QUOTIENT - -0 FOR NEG.	
1442	REP 1		00,2355 54 137 0	TS	DVNORMCT	DIVIDEND NORMALIZATION COUNT.	
1443	REP 1		00,2356 54 140 0	TS	MAXDVSN	NEAR-ONE DIVIDE FLAG.	
1444	REP 55	LAST 1120	00,2357 10 130 1	CCS	BUP	FORCE BUP POSITIVE WITH THE MAJOR PART	
1445	REP 1		00,2360 1 2516 0	TCP	BUPPOS	NON-ZERO.	
1446			00,2361 1 2363 1	TCP	+2		
1447	REP 1		00,2362 1 2531 0	TCP	BUPNEG		
1448	REP 477	LAST 1130	00,2363 54 156 1	BUPZERO	TS	MPAC +2	ZERO THIS.
1449	REP 9	LAST 1127	00,2364 0 7226 0	TC	TPAGREE	FORCE SIGN AGREEMENT BEFORE OVERFLOW	
1450	REP 478	LAST 1132	00,2365 10 154 0	CCS	MPAC	TEST TO SEE IF MPAC NON-ZERO. (TOO BIG)	
1451	REP 1		00,2366 1 2414 0	TCP	OVF+	MAJOR PART OF DIVIDEND IS POSITIVE NON-0	
1452			00,2367 1 2371 1	TCP	+2		
1453	REP 2	LAST 1132	00,2370 1 2413 1	TCP	OVF+ -1	MAJOR PART OF DIVIDEND IS NEG. NON-ZERO	
1454	REP 56	LAST 1132	00,2371 56 131 1	XCH	BUP +1	SHIFT DIVIDEND AND DIVISOR LEFT 14.	
1455	REP 57	LAST 1132	00,2372 56 130 0	XCH	BUP		
1456	REP 479	LAST 1132	00,2373 56 155 0	XCH	MPAC +1		
1457	REP 480	LAST 1132	00,2374 56 154 1	XCH	MPAC		
1458	REP 58	LAST 1132	00,2375 10 130 1	CCS	BUP		
1459	REP 1		00,2376 1 2422 0	TCP	BUP+	TRY AGAIN ON FORMER MINOR PART.	
1460			00,2377 1 2401 1	TCP	+2		
1461	REP 1		00,2400 1 2418 1	TCP	BUP-	OVERFLOW ON ZERO DIVISOR.	
1462	REP 481	LAST 1132	00,2401 4 0154 0	CS	MPAC	SIGN OF MPAC DETERMINES SIGN OF RESULT.	
1463			00,2402 0 0006 1	SGNDVOVF	EXTEND		
1464			00,2403 6 2405 1	BZMP	+2		
1465	REP 2	LAST 1132	00,2404 24 136 0	INCR	DVSIGN	NEOMAX IN MPAC PERHAPS.	
1466	REP 30	LAST 1111	00,2405 3 4672 0	DVOVF	CAP	ON DIVISION OVERFLOW OF ANY SORT, SET	
1467	REP 482	LAST 1132	00,2406 54 154 0	TS	POSMAX	SET DP MPAC TO +POSMAX.	
1468	REP 1		00,2407 0 2630 0	TC	FINALDV +3	SET OVERFLOW INDICATOR AND EXIT.	
1469	REP 137	LAST 1132	00,2410 3 4712 1	CAP	ONE		
1470	REP 5	LAST 1124	00,2411 54 121 1	TS	OVFIND		
1471	REP 37	LAST 1130	00,2412 0 6030 1	TC	DANZIG		
1472	REP 3	LAST 1132	00,2413 24 136 0	INCR	DVSIGN		
1473	REP 59	LAST 1132	00,2414 4 0131 0	CAP	BUP +1	LOAD LOWER ORDER PART OF DIVISOR.	
1474	REP 1		00,2415 1 2402 1	TCP	SGNDVOVF	GET SIGN OF RESULT.	
1475			00,2416 0 0006 1	BUP-	EXTEND		
1476	REP 60	LAST 1132	00,2417 4 0131 0	DCS	BUP	IF BUP IS NEGATIVE, COMPLEMENT IT AND	
1477	REP 61	LAST 1132	00,2420 52 131 0	DXCH	BUP	MAINTAIN DVSIGN FOR FINAL QUOTIENT SIGN.	
1478	REP 4	LAST 1132	00,2421 24 136 0	INCR	DVSIGN	NOW -0.	

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1479	REP 483	LAST 1132	00,2422	10 154 0	BUF+	CCS	MPAC	FORCE MPAC POSITIVE, CHECKING FOR ZERO DIVIDEND IN THE PROCESS.
1480	REP 1		00,2423	1 2437 1		TCP	MPAC+	
1481			00,2424	1 2426 1		TCP	+2	
1482	REP 1		00,2425	1 2433 0		TCP	MPAC-	
1483	REP 484	LAST 1133	00,2426	10 155 1		CCS	MPAC +1	
1484	REP 2	LAST 1133	00,2427	1 2437 1		TCP	MPAC+	
1485	REP 38	LAST 1132	00,2430	1 6030 0		TCP	DANZIG	EXIT IMMEDIATELY ON ZERO DIVIDEND.
1486	REP 2	LAST 1133	00,2431	1 2433 0		TCP	MPAC-	
1487	REP 39	LAST 1133	00,2432	1 6030 0		TCP	DANZIG	
1488			00,2433	0 0006 1	MPAC-	EXTEND		FORCE MPAC POSITIVE AS BUF IN BUF-.
1489	REP 485	LAST 1133	00,2434	4 0155 1		DCS	MPAC	
1490	REP 486	LAST 1133	00,2435	52 155 1		DXCH	MPAC	
1491	REP 5	LAST 1132	00,2436	24 136 0		INCR	DVISION	NOW +1 OR -0.

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1492	REP 467	LAST 1133	00,2437	4 0154 0	MPAC+	CS	MPAC	
1493	REP 27	LAST 1130	00,2440	6 7716 0		AD	NEONE	
1494	REP 62	LAST 1132	00,2441	6 0130 0		AD	BUP	
1495	REP 304	LAST 1130	00,2442	10 000 0		CCS	A	
1496	REP 1		00,2443	1 2505 1		TCP	DVNORM	
1497			00,2444	60001 0	-1/2+2	OCT	60001	
1498			00,2445	1 2446 1		TCP	+1	
1499	REP 11	LAST 1116	00,2446	3 4675 1		CAP	HALP	
1500			00,2447	6 0000 1		DOUBLE		
1501	REP 466	LAST 1134	00,2450	6 0155 0		AD	MPAC +1	
1502	REP 469	LAST 1134	00,2451	54 155 1		TS	MPAC +1	
1503	REP 225	LAST 1130	00,2452	3 4714 1		CAP	ZERO	
1504	REP 31	LAST 1132	00,2453	6 4672 0		AD	POSMAX	
1505	REP 490	LAST 1134	00,2454	26 154 0		ADS	MPAC	
1506	REP 12	LAST 1134	00,2455	3 4675 1		CAP	HALP	
1507			00,2456	6 0000 1		DOUBLE		SAME FOR BUP.
1508	REP 63	LAST 1134	00,2457	6 0131 1		AD	BUP +1	
1509	REP 64	LAST 1134	00,2460	54 131 0		TS	BUP +1	
1510	REP 226	LAST 1134	00,2461	3 4714 1		CAP	ZERO	
1511	REP 32	LAST 1134	00,2462	6 4672 0		AD	POSMAX	
1512	REP 65	LAST 1134	00,2463	26 130 1		ADS	BUP	
1513	REP 491	LAST 1134	00,2464	4 0154 0		CS	MPAC	
1514	REP 66	LAST 1134	00,2465	6 0130 0		AD	BUP	
1515	REP 305	LAST 1134	00,2466	10 000 0		CCS	A	
1516	REP 2	LAST 1134	00,2467	1 2505 1		TCP	DVNORM	
1517	REP 13	LAST 1114	00,2470	00133 0	LBUF2	ADRES	BUP2	
1518	REP 1		00,2471	1 2405 0		TCP	DVOVP	
1519	REP 2	LAST 1132	00,2472	54 140 0		TS	MAXDVS	
1520	REP 492	LAST 1134	00,2473	4 0155 1		CS	MPAC +1	
1521	REP 67	LAST 1134	00,2474	6 0131 1		AD	BUP +1	
1522			00,2475	0 0006 1		EXTEND		
1523	REP 2	LAST 1134	00,2476	6 2405 1		BZMP	DVOVP	
1524	REP 3	LAST 1134	00,2477	1 2505 1		TCP	DVNORM	

CHECK FOR DIVISION OVERFLOW. IF THE MAJOR PART OF THE DIVIDEND IS LESS THAN THE MAJOR PART OF THE DIVISOR BY AT LEAST TWO, WE CAN PROCEED IMMEDIATELY WITHOUT NORMALIZATION PRODUCING A DVMAX. USED IN SQRTSUB.

IF THE ABOVE DOES NOT HOLD, FORCE SIGN AGREEMENT IN NUMERATOR AND DENOMINATOR TO FACILITATE OVERFLOW AND NEAR-ONE CHECKING.

SAME FOR BUP.

CHECK MAGNITUDE OF SIGN-CORRECTED OPERANDS.

DIVIDE OK - WILL NOT BECOME MAXDV CASE.

DIVISOR NOT LESS THAN DIVIDEND - OVF.

IF THE MAJOR PARTS OF THE DIVIDEND AND DIVISOR ARE EQUAL, A SPECIAL APPROXIMATION IS USED (PROVIDED THE DIVISION IS POSSIBLE, OF COURSE).

IF NO OVERFLOW.

## L INTERPRETER

1525	REP 2 LAST 1132	00,2500 0 0006 1	BUFNORM	EXTEND		
1526		00,2501 24 137 1		AUG	DYNORMCT	ADD -1 TO AUGMENT SHIFT COUNT AND SHIFT
1527		00,2502 0 0006 1		EXTEND		LEPT ONE PLACE.
1528	REP 68 LAST 1134	00,2503 3 0131 1		DCA	BUP	
1529	REP 69 LAST 1135	00,2504 20 131 0		DAS	BUP	
1530	REP 70 LAST 1135	00,2505 3 0130 0	DVNORM	CA	BUP	SEE IF DIVISOR NORMALIZED YET.
1531		00,2506 6 0000 1		DOUBLE		
1532		00,2507 54 0000 0		OSK		NO - SHIFT LEPT ONE AND TRY AGAIN.
1533	REP 1	00,2510 1 2500 1		TCP	BURNORM	CALL DIVIDEND NORMALIZATION SEQUENCE
1534	REP 493 LAST 1134	00,2511 52 155 1		DXCH	MPAC	PRIOR TO DOING THE DIVIDE.
1535	REP 3 LAST 1135	00,2512 50 137 1		INDEX	DYNORMCT	
1536	REP 1	00,2513 0 2565 0		TC	MAXTEST	
1537	REP 494 LAST 1135	00,2514 54 156 1		TS	MPAC +2	RETURNS WITH DIVISION DONE AND C(A) = 0.
1538	REP 40 LAST 1133	00,2515 1 6030 0		TCP	DANZIG	
1539	REP 306 LAST 1134	00,2516 10 0000 0	BUPPOS	CCS	A	
1540	REP 2 LAST 1132	00,2517 1 2422 0		TOP	BUP+	TO BUP+ IF BUP IS GREATER THAN +1.
1541	REP 71 LAST 1135	00,2520 4 0131 0		CS	BUP +1	
1542		00,2521 0 0006 1		EXTEND		IF BUP IS +1, FORCING SIGN AGREEMENT
1543	REP 3 LAST 1135	00,2522 6 2422 1		BZMP	BUP+	MAY CAUSE BUP TO BECOME ZERO.
1544	REP 13 LAST 1134	00,2523 3 4875 1		CA	HALP	BRANCH IF SIGNS AGREE.
1545		00,2524 6 0000 1	+6	DOUBLE		SIGNS DISAGREE. FORCE AGREEMENT.
1546	REP 72 LAST 1135	00,2525 28 131 0		ADS	BUP +1	
1547	REP 227 LAST 1134	00,2526 3 4714 1		CA	ZERO	
1548	REP 73 LAST 1135	00,2527 54 130 1		TS	BUP	
1549	REP 1	00,2530 1 2363 1		TCP	BUPZERO	
1550	REP 307 LAST 1135	00,2531 10 0000 0	BURNEG	CCS	A	
1551	REP 2 LAST 1132	00,2532 1 2416 1		TOP	BUP-	TO BUP- IF BUP IS LESS THAN -1.
1552	REP 74 LAST 1135	00,2533 3 0131 1		CA	BUP +1	
1553		00,2534 0 0006 1		EXTEND		IF BUP IS -1, FORCING SIGN AGREEMENT
1554	REP 3 LAST 1135	00,2535 6 2416 0		BZMP	BUP-	MAY CAUSE BUP TO BECOME ZERO.
1555	REP 14 LAST 1135	00,2536 4 4875 0		CS	HALP	BRANCH IF SIGNS AGREE.
1556	REP 2 LAST 1132	00,2537 1 2524 1		TCP	BUPPOS +6	SIGNS DISAGREE. FORCE AGREEMENT.

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P1557 THE FOLLOWING ARE PROLOGUES TO SHIFT THE DIVIDEND ARRIVING IN A AND L BEFORE THE DIVIDE.

1559	REP	23	LAST	1124	00,2540	22 021 1	-21D	LXCH	SR	SPECIAL PROLOGUE FOR UNIT WHEN THE LENGTH OF THE ARGUMENT WAS NOT LESS THAN .5. IN THIS CASE, EACH COMPONENT MUST BE SHIFTED RIGHT ONE TO PRODUCE A HALF-UNIT VECTOR.
1560					00,2541	0 0008 1		EXTEND		
1561	REP	15	LAST	1135	00,2542	7 4875 0		MP	HALP	
1562	REP	187	LAST	1129	00,2543	56 001 0		XCH	L	
1563	REP	24	LAST	1136	00,2544	6 0021 1		AD	SR	
1564	REP	188	LAST	1138	00,2545	56 001 0		XCH	L	
1565	REP	1			00,2546	1 2571 1		TCP	GENDIV +1	WITH DP DIVIDEND IN A,L.
1566					00,2547	20 001 1		DDQBL		
1567					00,2550	20 001 1		DDQBL		PROLOGUE WHICH NORMALIZES THE DIVIDEND WHEN IT IS KNOWN THAT NO DIVISION OVERFLOW WILL OCCUR.
1568					00,2551	20 001 1		DDQBL		
1569					00,2552	20 001 1		DDQBL		
1570					00,2553	20 001 1		DDQBL		
1571					00,2554	20 001 1		DDQBL		
1572					00,2555	20 001 1		DDQBL		
1573					00,2558	20 001 1		DDQBL		
1574					00,2557	20 001 1		DDQBL		
1575					00,2580	20 001 1		DDQBL		
1576					00,2561	20 001 1		DDQBL		
1577					00,2562	20 001 1		DDQBL		
1578					00,2563	20 001 1		DDQBL		
1579	REP	495	LAST	1135	00,2564	52 155 1		DXCH	MPAC	
1580	REP	3	LAST	1134	00,2585	10 140 0	MAXTEST	CCS	MAXDVS	0 IP MAJORS MIGHT BE =, -1 OTHERWISE.
1581					00,2566	08552 0	BIASHI	DEC	.4192 B-1	SORT CONSTANTS
1582	REP	1			00,2587	1 2642 1		TCP	MAXDV	CHECK TO SEE IF THEY ARE NOW EQUAL.

## L INTERPRETER

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R1563 THE FOLLOWING IS A GENERAL PURPOSE DOUBLE PRECISION DIVISION ROUTINE. IT DIVIDES MPAC BY BUF AND LEAVES  
 R1565 THE RESULT IN MPAC. THE FOLLOWING CONDITIONS MUST BE SATISFIED

R1566 1. THE DIVISOR (BUF) MUST BE POSITIVE AND NOT LESS THAN .5.

R1567 2. THE DIVIDEND (MPAC) MUST BE POSITIVE WITH THE MAJOR PART OF MPAC STRICTLY LESS THAN THAT OF BUF.  
 R1569 (A SPECIAL APPROXIMATION, MAXDV, IS USED WHEN THE MAJOR PARTS ARE EQUAL).

R1591 UNDERSTANDING THAT  $A/B = Q + S(B/R)$  WHERE  $S = 2(-14)$  AND Q AND R ARE QUOTIENT AND REMAINDER, RESPEC-  
 R1593 TIVELY, THE FOLLOWING APPROXIMATION IS OBTAINED BY MULTIPLYING ABOVE AND BELOW BY  $C - SD$  AND NEGLECTING TERMS OF  
 R1595 ORDER  $S^2$  (POSSIBLY INTRODUCING ERROR INTO THE LOW TWO BITS OF THE RESULT). SIGN AGREEMENT IS UNNECESSARY.

R1597 
$$\frac{A + SB}{C + SD} = Q + S\left(\frac{C}{C + SD}\right)$$
 WHERE Q AND R ARE QUOTIENT AND REMAINDER OF  $\frac{A + SB}{C}$  RESPECTIVELY.

R1601 R1603 RESP 496 LAST 1138 (00,25770) 52 155.1 GENDDV DXCH MPAC WE NEED A AND B ONLY FOR FIRST DV.  
 (SPECIAL UNIT PROLOGUE ENTERS HERE).

1604 (00,25770) 0 0006 1 +1 EXTEND

1605 RESP 75 LAST 1135 (00,25772) 10 130 1 DV BUF

1606 RESP 497 LAST 1137 (00,25773) 52 155 1 DXCH MPAC

A NOW CONTAINS Q AND L, R.

1607 RESP 498 LAST 1137 (00,25774) 4 0154 0 CS MPAC FORM DIVIDEND FOR MINOR PART OF RESULT.

1608 (00,25775) 0 0006 1 EXTEND

1609 RESP 76 LAST 1137 (00,25776) 7 0131 0 MP BUF +1

1610 RESP 499 LAST 1137 (00,25777) 6 0155 0 AD MPAC +1

1611 (00,26000) 54 000 0 OVSK

1612 (00,26001) 1 2606 1 TCP +5

OVERFLOW AT THIS POINT IS POSITIVE SINCE R IS POSITIVE IN EVERY CASE.

1613 (00,26012) 0.0006 1 EXTEND

1614 RESP 77 LAST 1137 (00,26013) 60 130 0 SU BUF

1615 RESP 500 LAST 1137 (00,26014) 24 154 1 INCR MPAC

1616 RESP 1 (00,26015) 1 2610 0 TCP +DOWN

OVERFLOW CAN BE REMOVED BY SUBTRACTING C (BUF) ONCE SINCE R IS ALWAYS LESS THAN C IN THIS CASE. INCR COMPENSATES SUBTRACT. (SINCE C(A) IS STILL POSITIVE).

1617 (00,26016) 0 0006 1 +5 EXTEND

1618 RESP 1 (00,26017) 6 2620 1 BZMP -UP

C(A) CAN BE MADE LESS THAN C IN MAGNITUDE BY DIMINISHING IT BY C (SINCE C IS NOT LESS THAN .5) UNLESS C(A) = 0.

A1619

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L INTERPRETER

1620							
1621	REF 76	LAST 1137	00,2610 0 0006 1	+DOWN	EXTEND		
1622			00,2611 60 130 0		SU BUP		
1623			00,2612 0 0006 1		EXTEND		
1624			00,2613 1 2616 0		B2P +3		
1625	REF 1		00,2614 0 0006 1		EXTEND		
			00,2615 6 2624 0		B2MP ENDMAXDV		
1626	REF 501	LAST 1137	00,2616 24 154 1	+3	INCR	MPAC	
1627	REF 2	LAST 1132	00,2617 1 2625 0		TOP	FINALDV	KEEP SUBTRACT HERE AND COMPENSATE.
1628					EXTEND		
1629	REF 3	LAST 1136	00,2620 0 0006 1	-UP	B2P	FINALDV +3	IF ZERO, SET MINOR PART OF RESULT TO ZERO.
1630			00,2621 1 2630 1				
1631	REF 502	LAST 1136	00,2622 0 0006 1		EXTEND		
1632	REF 79	LAST 1136	00,2623 26 154 0		DIM	MPAC	
			00,2624 6 0130 0		ENDMAXDV	AD BUP	IF NEGATIVE, ADD C TO A, SUBTRACTING ONE TO COMPENSATE. DIM IS OK HERE SINCE THE MAJOR PART NEVER GOES NEGATIVE.

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1633		00,2625	22 007 0	FINALDV	ZL		DO DV TO OBTAIN MINOR PART OF RESULT.
1634		00,2626	0 0006 1		EXTEND		
1635	REP 80	LAST 1138	00,2627	10 130 1	DV	BUP	
1636	REP 503	LAST 1138	00,2630	54 155 1	+3	TS	MPAC +1
1637	REP 6	LAST 1133	00,2631	10 138 1	CCS	DVSIGN	LEAVE RESULT POSITIVE UNLESS C(DVSIGN)=
1638	REP 259	LAST 1129	00,2632	0 0002 0	TC	0	-0.
1639	REP 260	LAST 1139	00,2633	0 0002 0	TC	0	
1640	REP 281	LAST 1139	00,2634	0 0002 0	TC	0	
1641		00,2635	0 0006 1		EXTEND		
1642	REP 504	LAST 1139	00,2636	4 0155 1	DCS	MPAC	
1643	REP 505	LAST 1139	00,2637	52 155 1	DXCH	MPAC	
1644	REP 228	LAST 1135	00,2640	3 4714 1	CAP	ZERO	SO WE ALWAYS RETURN WITH C(A) = 0.
1645	REP 262	LAST 1139	00,2641	0 0002 0	TC	0	

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R1646 IF THE MAJOR PARTS OF THE DIVISOR AND DIVIDEND ARE EQUAL, BUT THE MINOR PARTS ARE SUCH THAT THE  
R1648 DIVIDEND IS STRICTLY LESS THAN THE DIVISOR IN MAGNITUDE, THE FOLLOWING APPROXIMATION IS USED. THE ASSUMPTIONS  
R1650 ARE THE SAME AS THE GENERAL ROUTINE WITH THE ADDITION THAT SIGN AGREEMENT IS NECESSARY (B, C, d D POSITIVE).

R1652 C + SB (C + B - D)  
R1653 ----- = 37777 + S(-----)  
R1654 C + SD ( C )

R1655 THE DIVISION MAY BE PERFORMED IMMEDIATELY SINCE B IS STRICTLY LESS THAN D AND C IS NOT LESS THAN .5.  
1657 REP 506 LAST 1139 00,2642 4 0154 0 MAXDV CS MPAC  
1658 REP 61 LAST 1139 00,2643 6 0130 0 AD BUF SEE IF MAXDV CASE STILL HOLDS AFTER  
1659 00,2644 0 0006 1 EXTEND NORMALIZATION.  
1660 00,2645 1 2647 1 BZF +2  
1661 REP 2 LAST 1136 00,2646 1 2570 0 TCP GENDDV MPAC NOW LESS THAN BUF - DIVIDE AS USUAL  
1662 REP 33 LAST 1134 00,2647 3 4672 0 +2 CAF POSMAX  
1663 REP 507 LAST 1140 00,2650 54 154 0 TS MPAC SET MAJOR PART OF RESULT.  
1664 REP 82 LAST 1140 00,2651 4 0131 0 CS BUF +1 FORM DIVIDEND OF MINOR PART OF RESULT.  
1665 REP 508 LAST 1140 00,2652 6 0155 0 AD MPAC +1  
1666 REP 2 LAST 1138 00,2653 1 2624 1 TCP ENDMAXDV GO ADD C AND DO DIVIDE, ATTACHING SIGN  
A1667 BEFORE EXITING.

## L INTERPRETER

P1668 VECTOR DIVIDED BY SCALAR, V/SC, IS EXECUTED HERE. THE VECTOR IS NOW IN MPAC WITH SCALAR IN BUP.

1670	REF 138	LAST 1132	00,2654 4 4712 0	V/SC2	CS	ONE	INITIALIZE DIVIDEND NORMALIZATION COUNT
1671	REF 4	LAST 1135	00,2655 54 137 0		TS	DVNORMCT	AND DIVISION SIGN REGISTER.
1672	REF 41	LAST 1118	00,2656 54 127 1		TS	VBUP +5	
1673	REF 1		00,2657 0 3010 0		TC	VECAGREE	FORCE SIGN AGREEMENT IN VECTOR
1674	REF 63	LAST 1140	00,2660 52 131 0		DXCH	BUP	
1675	REF 1		00,2661 0 7513 1		TC	ALSIGNAG	SIGN AGREE BUP
1676	REF 84	LAST 1141	00,2662 52 131 0		DXCH	BUP	
1677	REF 85	LAST 1141	00,2663 10 130 1		CCS	BUP	FORCE DIVISOR POSITIVE WITH MAJOR PART
1678	REF 1		00,2664 1 2721 0		TCP	/BUP+	NON-ZERO (IF POSSIBLE).
1679			00,2665 1 2667 0		TCP	+2	
1680	REF 1		00,2666 1 2715 1		TCP	/BUP-	
1681	REF 86	LAST 1141	00,2667 56 131 1		XCH	BUP +1	SHIFT VECTOR AND SCALAR LEFT 14.
1682	REF 87	LAST 1141	00,2670 56 130 0		XCH	BUP	
1683	REF 509	LAST 1140	00,2671 56 155 0		XCH	MPAC +1	
1684	REF 510	LAST 1141	00,2672 56 154 1		XCH	MPAC	
1685			00,2673 0 0006 1		EXTEND		CHECK FOR OVERFLOW IN EACH CASE.
1686			00,2674 1 2876 0		BZP	+2	
1687	REF 3	LAST 1134	00,2675 1 2405 0		TCP	DVOVP	
1688	REF 511	LAST 1141	00,2676 56 180 0		XCH	MPAC +4	
1689	REF 512	LAST 1141	00,2677 56 157 1		XCH	MPAC +3	
1690			00,2700 0 0006 1		EXTEND		
1691			00,2701 1 2703 0		BZP	+2	
1692	REF 4	LAST 1141	00,2702 1 2405 0		TCP	DVOVP	
1693	REF 513	LAST 1141	00,2703 56 162 1		XCH	MPAC +6	
1694	REF 514	LAST 1141	00,2704 56 161 1		XCH	MPAC +5	
1695			00,2705 0 0006 1		EXTEND		
1696			00,2706 1 2710 1		BZP	+2	
1697	REF 5	LAST 1141	00,2707 1 2405 0		TCP	DVOVP	
1698	REF 88	LAST 1141	00,2710 10 130 1		CCS	BUP	
1699	REF 2	LAST 1141	00,2711 1 2721 0		TCP	/BUP+	ZERO DIVISOR - OVERFLOW.
1700	REF 6	LAST 1141	00,2712 1 2405 0		TCP	DVOVP	
1701	REF 2	LAST 1141	00,2713 1 2715 1		TCP	/BUP-	
1702	REF 7	LAST 1141	00,2714 1 2405 0		TCP	DVOVP	
1703			00,2715 0 0006 1	/BUP-	EXTEND		ON NEGATIVE, COMPLEMENT BUP AND MAINTAIN
1704	REF 89	LAST 1141	00,2716 4 0131 0		DCS	BUP	DVSIGN IN VBUP +5.
1705	REF 90	LAST 1141	00,2717 52 131 0		DXCH	BUP	
1706	REF 42	LAST 1141	00,2720 24 127 0		INCR	VBUP +5	

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1707	REP 91 LAST 1141	00,2721 0 0006 1	/BUF+	EXTEND	
1708		00,2722 3 0131 1		DCA BUF	LEAVE ABS(ORIG DIVISOR) IN BUF2
1709	REP 14 LAST 1134	00,2723 52 134 0		DXCH BUF2	FOR OVERFLOW TESTING
1710	REP 1	00,2724 1 2732 1		TCP /NORM	NORMALIZE DIVISOR IN BUF.
1711		00,2725 0 0006 1	/NORM2	EXTEND	
1712	REP 5 LAST 1141	00,2726 24 137 1		AUG DVNORMCT	IP LESS THAN .5, AUGMENT DVNORMCT AND
1713		00,2727 0 0006 1		EXTEND	DOUBLE DIVISOR.
1714	REP 92 LAST 1142	00,2730 3 0131 1		DCA BUF	
1715	REP 93 LAST 1142	00,2731 20 131 0		DAS BUF	
1716	REP 94 LAST 1142	00,2732 3 0130 0	/NORM	CA BUF	SEE IP DIVISOR NORMALIZED.
1717		00,2733 6 0000 1		DOUBLE	
1718		00,2734 54 000 0		OVSK	
1719	REP 1	00,2735 1 2725 1		TCP /NORM2	DOUBLE AND TRY AGAIN IF NOT.
1720	REP 1	00,2736 0 2750 1		TC V/SCDV	
1721	REP 515 LAST 1141	00,2737 52 160 1		DXCH MPAC +3	DO X COMPONENT DIVIDE.
1722	REP 516 LAST 1142	00,2740 52 155 1		DXCH MPAC	SUPPLY ARGUMENTS IN USUAL SEQUENCE.
1723	REP 517 LAST 1142	00,2741 52 160 1		DXCH MPAC +3	
1724	REP 2 LAST 1142	00,2742 0 2750 1		TC V/SCDV	Y COMPONENT.
1725	REP 518 LAST 1142	00,2743 52 162 0		DXCH MPAC +5	
1726	REP 519 LAST 1142	00,2744 52 155 1		DXCH MPAC	
1727	REP 520 LAST 1142	00,2745 52 162 0		DXCH MPAC +5	
1728	REP 3 LAST 1142	00,2746 0 2750 1		TC V/SCDV	Z COMPONENT.
1729	REP 2 LAST 1125	00,2747 1 7387 0		TCP VROTATEX	GO RE-ARRANGE COMPONENTS BEFORE EXIT.

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P1730 SUBROUTINE USED BY V/SC TO DIVIDE VECTOR COMPONENT IN MPAC,+1 BY THE SCALAR GIVEN IN BUF.

1732	REP	43	LAST	1141	00,2750	3 0127 0	V/SCDV	CA	VBUP +5	REFLECTS SIGN OF SCALAR.
1733	REP	7	LAST	1139	00,2751	54 136 1		TS	DVSIGN	
1734	REP	521	LAST	1142	00,2752	10 154 0		CCS	MPAC	
1735	REP	1			00,2753	1 2767 1		TCP	/MPAC+	FORCE MPAC POSITIVE, EXITING ON ZERO.
1736					00,2754	1 2756 0		TCP	+2	
1737	REP	1			00,2755	1 2763 0		TCP	/MPAC-	
1738	REP	522	LAST	1143	00,2756	10 155 1		CCS	MPAC +1	
1739	REP	2	LAST	1143	00,2757	1 2767 1		TCP	/MPAC+	
1740	REP	263	LAST	1139	00,2760	0 0002 0		TC	0	
1741	REP	2	LAST	1143	00,2761	1 2763 0		TCP	/MPAC-	
1742	REP	264	LAST	1143	00,2762	0 0002 0		TC	0	
1743					00,2763	0 0006 1	/MPAC-	EXTEND		USUAL COMPLEMENTING AND SETTING OF SIGN.
1744	REP	523	LAST	1143	00,2764	4 0155 1		DCS	MPAC	
1745	REP	524	LAST	1143	00,2765	52 155 1		DXCH	MPAC	
1746	REP	8	LAST	1143	00,2766	24 136 0		INCR	DVSIGN	
1747	REP	139	LAST	1141	00,2767	4 4712 0	/MPAC+	CS	ONE	INITIALIZE NEAR-ONE SWITCH.
1748	REP	4	LAST	1136	00,2770	54 140 0		TS	MAXDVS	
1749	REP	525	LAST	1143	00,2771	4 0154 0		CS	MPAC	CHECK POSSIBLE OVERFLOW.
1750	REP	15	LAST	1142	00,2772	6 0133 0		AD	BUF2	UNNORMALIZED INPUT DIVISOR.
1751	REP	308	LAST	1135	00,2773	10 000 0		CCS	A	
1752	REP	1			00,2774	1 3004 1		TCP	DDVCALL	
1753					00,2775	1 2777 0		TCP	+2	NOT NEAR-ONE
1754	REP	8	LAST	1141	00,2776	1 2405 0		TCP	DVOVF	+0 IS JUST POSSIBLE
1755	REP	5	LAST	1143	00,2777	54 140 0		TS	MAXDVS	NO HOPE
1756	REP	526	LAST	1143	00,3000	4 0155 1		CS	MPAC +1	SIGNAL POSSIBLE NEAR-ONE CASE
1757	REP	16	LAST	1143	00,3001	6 0134 1		AD	BUF2 +1	SEE IF DIVISION CAN BE DONE
1758					00,3002	0 0006 1		EXTEND		
1759	REP	9	LAST	1143	00,3003	6 2405 1		BZMP	DVOVF	
1760	REP	527	LAST	1143	00,3004	52 155 1	DDVCALL	DXCH	MPAC	CALL PRE-DIVIDE NORMALIZATION.
1761	REP	6	LAST	1142	00,3005	50 137 1		INDEX	DVNORMCT	
1762	REP	2	LAST	1135	00,3006	1 2585 1		TCP	MAXTEST	

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1763		00,3007	32506 0	SLOPELO DEC	.6324		
1764	REF 265	LAST 1143	00,3010	56 002 0	VECAGREE XCH	Q	SAVE Q IN A
1765	REF 528	LAST 1143	00,3011	52 155 1	DXCH	MPAC	
1766	REF 2	LAST 1141	00,3012	0 7513 1	TC	ALSIGNAG	SIGNAGREE MPAC
1767	REF 529	LAST 1144	00,3013	52 155 1	DXCH	MPAC	
1768	REF 530	LAST 1144	00,3014	52 160 1	DXCH	MPAC +3	
1769	REF 3	LAST 1144	00,3015	0 7513 1	TC	ALSIGNAG	SIGN AGREE MPAC +3
1770	REF 531	LAST 1144	00,3016	52 160 1	DXCH	MPAC +3	
1771	REF 532	LAST 1144	00,3017	52 162 0	DXCH	MPAC +5	
1772	REF 4	LAST 1144	00,3020	0 7513 1	TC	ALSIGNAG	SIGNAGREE MPAC +5
1773	REF 533	LAST 1144	00,3021	52 162 0	DXCH	MPAC +5	
1774	REF 309	LAST 1143	00,3022	0 0000 1	TC	A	

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P1775 THE FOLLOWING ROUTINE EXECUTES THE UNIT INSTRUCTION, WHICH TAKES THE UNIT OF THE VECTOR IN MPAC.

1777	REP	2	LAST	1141	00,3023	0 3010 0	UNIT	TC	VEGAGREE	FORCE SIGN AGREEMENT IN VECTOR
1778	REP	2	LAST	1114	00,3024	0 7501 1		TC	MPACVBUP	SAVE ARGUMENT IN VBUP
1779	REP	229	LAST	1139	00,3025	3 4714 1		CAP	ZERO	MUST SENSE OVERFLOW IN FOLLOWING DOT.
1780	REP	6	LAST	1132	00,3026	56 121 0		XCH	OVPIND	
1781	REP	3	LAST	68	00,3027	54 141 1		TS	TEM1	
1782	REP	1			00,3030	0 3317 1		TC	VSQSUB	
1783	REP	4	LAST	1145	00,3031	3 0141 0		CA	TEM1	
1784	REP	7	LAST	1145	00,3032	56 121 0		XCH	OVPIND	
1785					00,3033	0 0006 1		EXTEND		
1786					00,3034	1 3036 0		BZP	+2	
1787	REP	10	LAST	1143	00,3035	1 2405 0		TCF	DVOVP	
1788					00,3036	0 0006 1		EXTEND		
1789	REP	534	LAST	1144	00,3037	3 0155 0		DCA	MPAC	
1790	REP	26	LAST	1099	00,3040	50 120 1		INDEX	FIXLOC	
1791	REP	1			00,3041	52 043 1		DXCH	LVSQUARE	
1792	REP	1			00,3042	0 3343 0		TC	SORTSUB	GO TAKE THE NORMALIZED SQUARE ROOT.
1793	REP	535	LAST	1145	00,3043	10 154 0		CCS	MPAC	
1794					00,3044	1 3051 1		TCF	+5	
1795	REP	189	LAST	1136	00,3045	54 001 1		TS	L	
1796	REP	27	LAST	1145	00,3046	50 120 1		INDEX	FIXLOC	
1797	REP	1			00,3047	52 045 1		DXCH	LV	
1798	REP	11	LAST	1145	00,3050	1 2405 0		TCF	DVOVP	INPUT TO SORTSUB WAS 0.
1799	REP	1			00,3051	4 4333 1		CS	FOURTEEN	
1800	REP	46	LAST	1131	00,3052	6 0135 0		AD	MPTEMP	SEE IF THE INPUT WAS SO SMALL THE THE
1801	REP	310	LAST	1144	00,3053	10 000 0		CCS	A	FIRST TWO REGISTERS OF THE SQUARE WERE 0
1802					00,3054	4 0000 0		COM		IF SO, SAVE THE NEGATIVE OF THE SHIFT
1803	REP	1			00,3055	1 3133 1		TCF	SMALL	COUNT -15D.
1804	REP	1			00,3056	1 3065 0		TCF	LARGE	(THIS IS USUALLY THE CASE.)
1805	REP	4	LAST	1061	00,3057	4 4720 1		CS	THIRTEEN	
1806	REP	47	LAST	1145	00,3060	54 135 1		TS	MPTEMP	IF THE SHIFT COUNT WAS EXACTLY 14, SET
1807	REP	536	LAST	1145	00,3061	3 0154 1		CA	MPAC	THE PRE-DIVIDE NORM COUNT TO -13D.
1808	REP	190	LAST	1145	00,3062	54 001 1	SMALL2	TS	L	SHIFT THE LENGTH RIGHT 14 BEFORE STORING
1809	REP	230	LAST	1145	00,3063	3 4714 1		CAP	ZERO	(SMALL EXITS TO THIS POINT).
1810	REP	1			00,3064	1 3112 1		TCF	LARGE2	GO TO STORE LENGTH AND PROCEED.
1811	REP	48	LAST	1145	00,3065	10 135 1	LARGE	CCS	MPTEMP	MOST ALL CASES COME HERE.
1812	REP	1			00,3066	1 3074 0		TCF	LARGE3	SEE IF NO NORMALIZATION WAS REQUIRED BY
1813	REP	1			00,3067	4 2024 1		CS	SRDDV	
1814	REP	49	LAST	1145	00,3070	54 135 1		TS	MPTEMP	
1815					00,3071	0 0006 1		EXTEND		
1816	REP	537	LAST	1145	00,3072	3 0155 0		DCA	MPAC	SORT, AND IF SO, SET UP FOR A SHIFT
										RIGHT 1 BEFORE DIVIDING TO PRODUCE
										THE DESIRED HALF UNIT VECTOR.

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1817 REP 2 LAST 1145 00,3073 1 3112 1

TCP LAROE2

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1818			00,3074	4 0000 0	LARGE3	COM			
1819	REP	50	LAST 1145	00,3075	54 135 1	TS	MPTEMP		LEAVE NEGATIVE OF SHIFT COUNT-1 FOR PREDIVIDE LEFT SHIFT.
1820			00,3076	4 0000 0		COM			
1821	REP	311	LAST 1145	00,3077	50 000 1	INDEX	A		PICK UP REQUIRED SHIFTING BIT TO UNNORM-
1822	REP	66	LAST 1130	00,3100	3 4675 1	CAP	BIT14		ALIZE THE SORT RESULT.
1823	REP	95	LAST 1142	00,3101	54 130 1	TS	BUP		
1824			00,3102	0 0008 1		EXTEND			
1825	REP	538	LAST 1145	00,3103	7 0155 1	MP	MPAC +1		
1826	REP	96	LAST 1147	00,3104	58 130 0	XCH	BUP		
1827			00,3105	0 0008 1		EXTEND			(UNNORMALIZE THE SORT FOR LV).
1828	REP	539	LAST 1147	00,3106	7 0154 0	MP	MPAC		
1829	REP	191	LAST 1145	00,3107	58 001 0	XCH	L		
1830	REP	97	LAST 1147	00,3110	6 0130 0	AD	BUP		
1831	REP	192	LAST 1147	00,3111	58 001 0	XCH	L		
1832	REP	28	LAST 1145	00,3112	50 120 1	LARGE2	INDEX	PIXLOC	
1833	REP	2	LAST 1145	00,3113	52 045 1	DXCH	LV		LENGTH NOW STORED IN WORK AREA.
1834	REP	140	LAST 1143	00,3114	4 4712 0	CS	ONE		
1835	REP	6	LAST 1143	00,3115	54 140 0	TS	MAXDVSW		NO MAXDV CASES IN UNIT.
1836	REP	44	LAST 1143	00,3116	52 123 0	DXCH	VBUP		
1837	REP	540	LAST 1147	00,3117	52 155 1	DXCH	MPAC		PREPARE X COMPONENT FOR DIVIDE, SETTING LENGTH OF VECTOR AS DIVISOR IN BUP.
1838	REP	98	LAST 1147	00,3120	52 131 0	DXCH	BUP		
1839	REP	1		00,3121	0 3151 1	TC	UNITDV		
1840	REP	45	LAST 1147	00,3122	52 125 0	DXCH	VBUP +2		
1841	REP	541	LAST 1147	00,3123	52 155 1	DXCH	MPAC		DO Y AND Z IN USUAL FASHION SO WE CAN EXIT THROUGH VRotateX.
1842	REP	542	LAST 1147	00,3124	52 160 1	DXCH	MPAC +3		
1843	REP	2	LAST 1147	00,3125	0 3151 1	TC	UNITDV		
1844	REP	46	LAST 1147	00,3126	52 127 1	DXCH	VBUP +4		
1845	REP	543	LAST 1147	00,3127	52 155 1	DXCH	MPAC		
1846	REP	544	LAST 1147	00,3130	52 182 0	DXCH	MPAC +5		
1847	REP	3	LAST 1147	00,3131	0 3151 1	TC	UNITDV		
1848	REP	3	LAST 1142	00,3132	1 7367 0	TOP	VRotateX		AND EXIT.

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P1849 IF THE LENGTH OF THE ARGUMENT VECTOR WAS LESS THAN 2(-28), EACH COMPONENT MUST BE SHIFTED LEFT AT LEAST 14 PLACES BEFORE THE DIVIDE. NOTE THAT IN THIS CASE, THE MAJOR PART OF EACH COMPONENT IS ZERO.

1853	REP	51	LAST	1147	00,3133	54 135 1	SMALL	TS	MPTEMP	NEGATIVE OF PRE-DIVIDE SHIFT COUNT.
1854	REP	231	LAST	1145	00,3134	3 4714 1		CAP	ZERO	SHIFT EACH COMPONENT LEFT 14.
1855	REP	47	LAST	1147	00,3135	56 123 1		XCH	VBUP +1	
1856	REP	48	LAST	1148	00,3136	56 122 0		XCH	VBUP	
1857	REP	49	LAST	1148	00,3137	58 125 1		XCH	VBUP +3	
1858	REP	50	LAST	1148	00,3140	58 124 0		XCH	VBUP +2	
1859	REP	51	LAST	1148	00,3141	58 127 0		XCH	VBUP +5	
1860	REP	52	LAST	1148	00,3142	58 126 1		XCH	VBUP +4	
1861	REP	52	LAST	1148	00,3143	4 0135 1		CS	MPTEMP	
1862	REP	312	LAST	1147	00,3144	50 000 1		INDEX	A	
1863	REP	67	LAST	1147	00,3145	3 4675 1		CAP	BIT14	
1864					00,3146	0 0008 1		EXTEND		
1865	REP	545	LAST	1147	00,3147	7 0154 0		MP	MPAC	
1866	REP	1			00,3150	1 3062 1		TOP	SMALL2	
1867	REP	4	LAST	724	4720		THIRTEEN =		OCT15	
1868	REP	2	LAST	736	4333		FOURTEEN =		OCT18	
1869	REP	14	LAST	369	4333		OCT18 =		R1D1	

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P1870 THE FOLLOWING ROUTINE SETS UP THE CALL TO THE DIVIDE ROUTINES.

1871	REF 546	LAST 1148	00,3151	10 154 0	INITDV	CCS	MPAC	FORCE MPAC POSITIVE IF POSSIBLE, SETTING DVSIGN ACCORDING TO THE SIGN OF MPAC SINCE THE DIVISOR IS ALWAYS POSITIVE HERE.
1872	REF 1		00,3152	1 3170 0		TCP	UMPAC+	
1873			00,3153	1 3155 1		TCP	+2	
1874	REF 1		00,3154	1 3162 0		TCP	UMPAC-	
1875	REF 547	LAST 1149	00,3155	10 155 1		CCS	MPAC +1	
1876	REF 2	LAST 1149	00,3156	1 3170 0		TCP	UMPAC+	EXIT IMMEDIATELY ON ZERO.
1877	REF 266	LAST 1144	00,3157	0 0002 0		TC	0	
1878	REF 2	LAST 1149	00,3160	1 3162 0		TCP	UMPAC-	
1879	REF 267	LAST 1149	00,3161	0 0002 0		TC	0	
1880	REF 232	LAST 1148	00,3162	4 4714 0	UMPAC-	CS	ZERO DVSIGN	IF NEGATIVE, SET -0 IN DVSIGN FOR FINAL COMPLEMENT.
1881	REF 9	LAST 1143	00,3163	54 136 1		TS		
1882			00,3164	0 0006 1		EXTEND		
1883	REF 548	LAST 1149	00,3165	4 0155 1		DCS	MPAC	PICK UP ABSOLUTE VALUE OF ARG AND JUMP.
1884	REF 53	LAST 1148	00,3166	50 135 0		INDEX	MPTEMP	
1885	REF 3	LAST 1143	00,3167	1 2564 0		TCP	MAXTEST -1	
1886	REF 10	LAST 1149	00,3170	54 136 1	UMPAC+	TS	DVSIGN	SET DVSIGN FOR POSITIVE QUOTIENT.
1887	REF 549	LAST 1149	00,3171	52 155 1		DXCH	MPAC	
1888	REF 54	LAST 1149	00,3172	50 135 0		INDEX	MPTEMP	
1889	REF 4	LAST 1149	00,3173	1 2564 0		TCP	MAXTEST -1	

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## P1890 MISCELLANEOUS UNARY OPERATIONS.

1891	REF	1		00,3174	0 3300 1	DSQ	TC	DSQSUB	SQUARE THE DP CONTENTS OF MPAC.
1892	REF	41	LAST	1135	00,3175	1 6030 0	TCP		DANZIG
1893	REF	22	LAST	1131	00,3176	10 183 1	ABVALABS	CCS	MODE
1894	REF	1		00,3177	1 3228 0		TCP		ABS
1895	REF	2	LAST	1150	00,3200	1 3228 0	TCP		ABS
1896	REF	2	LAST	1145	00,3201	0 3317 1	ABVAL	TC	VSQSUB
1897	REF	23	LAST	1150	00,3202	22 183 0	LXCH		MODE
1898				00,3203	0 0008 1		EXTEND		
1899	REF	550	LAST	1149	00,3204	3 0155 0	DCA		MPAC
1900	REF	29	LAST	1147	00,3205	50 120 1	INDEX		FIXLOC
1901	REF	2	LAST	1145	00,3206	52 043 1	DXCH		LVSQUARE

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P1902 PROGRAM DESCRIPTION- SUBROUTINE SORT  
 R1903 FUNCTIONAL DESCRIPTION-DOUBLE PRECISION SQUARE ROOT ROUTINE  
 R1904 THIS PROGRAM TAKES THE SQUARE ROOT OF THE 27 OR 28 MOST SIGNIFICANT BITS IN THE TRIPLE PRECISION SET OF  
 R1906 NUMBERS-MPAC,MPAC+1,AND MPAC+2. THE ROOT IS RETURNED DOUBLE PRECISION IN MPAC AND MPAC+1.  
 R1908 WARNING- THIS SUBROUTINE USES A TRIPLE PRECISION INPUT. THE PROGRAMMER MUST ASSURE THE CONTENTS OF MPAC+2  
 R1910 ESPECIALLY IF THE CONTENTS OF MPAC IS SMALL OR ZERO. FOR DETAILS SEE STG MEMO NO.949.  
 R1912 CALLING SEQUENCE- IN INTERPRETIVE MODE I.E., FOLLOWING TC INTRET,SORT NO ADDRESS IS ALLOWED  
 R1914 INPUT SCALING THE BINARY POINT IS ASSUMED TO THE RIGHT OF BIT 15. THE ANSWER IS RETURNED WITH THE SAME SCALING  
 R1916 SUBROUTINES- GNSCR,MPACSHR, SORTSUB,ABORT  
 R1917 ABORT EXIT MODE- ABORTS ON NEGATIVE INPUT -1.2X10E-4 (77775 OCTAL) OR LESS.  
 R1919 DISPLAYS ERROR CODE 1302  
 R1920 TC ABORT  
 R1921 OCT 1302  
 R1922 DEBRIS - LOCATIONS BUF,MPITEMP,ADDRWD ARE USED  
 1923 RSP 2 LAST 1145 00,3207 0 3343 0 SORT TC SORTSUB  
 1924 RSP 55 LAST 1149 00,3210 10 135 1 CCS MPITEMP  
 1925 RSP 00,3211 1 3213 0 TCP +2  
 1926 RSP 42 LAST 1150 00,3212 1 6030 0 TCP DANZIG  
 1927 RSP 3 LAST 1130 00,3213 6 3730 0 AD NEG12  
 1928 RSP 00,3214 0 0008 1 EXTEND  
 1929 RSP 1 00,3215 6 3221 0 BZMF SORTSHFT  
 1930 RSP 00,3216 22 007 0 ZL  
 1931 RSP 77 LAST 1131 00,3217 22 116 1 LXCH ADDRWD  
 1932 RSP 4 LAST 1130 00,3220 1 2303 1 TCP GNSCR +4  
 1933 RSP 56 LAST 1151 00,3221 50 135 0 SORTSHFT INDEX MPITEMP  
 1934 RSP 45 LAST 1101 00,3222 3 4674 0 CAP BIT15  
 1935 RSP 57 LAST 1151 00,3223 54 135 1 TS MPITEMP  
 1936 RSP 233 LAST 1149 00,3224 3 4714 1 CAP ZERO  
 1937 RSP 2 LAST 1130 00,3225 1 2036 1 TCP MPACSHR +3  
 1938 RSP 3 LAST 1127 00,3226 0 6672 1 ABS TC BRANCH  
 1939 RSP 43 LAST 1151 00,3227 1 6030 0 TCP DANZIG  
 1940 RSP 44 LAST 1151 00,3230 1 6030 0 TCP DANZIG  
 1941 RSP 4 LAST 1121 00,3231 1 7637 0 TCP COMP

TAKE THE SQUARE ROOT OF MPAC.  
 RETURNED NORMALIZED SQUARE ROOT. SEE IF  
 ANY UN-NORMALIZATION REQUIRED AND EXIT  
 IF NOT.

A RIGHT SHIFT OF MORE THAN 13 COULD BE  
 REQUIRED IF INPUT WAS ZERO IN MPAC,+1.  
 GOES HERE IN MOST CASES.  
 IF A LONG SHIFT IS REQUIRED, GO TO  
 GENERAL RIGHT SHIFT ROUTINES.  
 ADDRWD WAS ZERO TO PREVENT ROUND.

SELECT SHIFTING BIT AND EXIT THROUGH  
 SHIFT ROUTINES.

TO ZERO MPAC +2 IN THE PROCESS.

TEST SIGN OF MPAC AND COMPLEMENT IF

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1942	REP 16 LAST 1116	00,3232 4 4710 1	VDEF	CS FOUR	VECTOR DEFINE - ESSENTIALLY TREATS SCALAR IN MPAC AS X COMPONENT, PUSHES UP FOR Y AND THEN AGAIN FOR Z.
1943	REP 13 LAST 1119	00,3233 26 166 1		ADS PUSHLOC	
1944		00,3234 0 0006 1		EXTEND	
1945	REP 313 LAST 1148	00,3235 5 0000 1		INDEX A	
1946		00,3236 3 0003 1		DCA 2	
1947	REP 551 LAST 1150	00,3237 52 160 1		DXCH MPAC +3	
1948		00,3240 0 0006 1		EXTEND	
1949	REP 14 LAST 1152	00,3241 5 0166 0		INDEX PUSHLOC	
1950		00,3242 3 0001 0		DCA 0	
1951	REP 552 LAST 1152	00,3243 52 162 0		DXCH MPAC +5	
1952	REP 2 LAST 1116	00,3244 1 6470 0		TCP VMODE	
1953	REP 3 LAST 1150	00,3245 0 3317 1	VSQ	TC VSOSUB	MODE IS NON VECTOR.
1954	REP 1	00,3246 1 7301 0		TCP DMODE	DOT MPAC WITH ITSELF. MODE IS NOW DP.
1955		00,3247 0 0006 1	PUSH	EXTEND	
1956	REP 553 LAST 1152	00,3250 3 0155 0		DCA MPAC	PUSH DOWN MPAC LEAVING IT LOADED.
1957	REP 15 LAST 1152	00,3251 50 166 0		INDEX PUSHLOC	PUSH DOWN FIRST TWO REGISTERS IN EACH
1958		00,3252 52 001 1		DXCH 0	
1959	REP 24 LAST 1150	00,3253 50 163 0		INDEX MODE	INCREMENT PUSHDOWN POINTER.
1960	REP 5 LAST 1098	00,3254 3 6213 1		CAP NO.WDS	
1961	REP 16 LAST 1152	00,3255 26 166 1		ADS PUSHLOC	
1962	REP 25 LAST 1152	00,3256 10 163 1		CCS MODE	
1963	REP 1	00,3257 1 3272 1		TCP TPUSH	PUSH DOWN MPAC +2.
1964	REP 45 LAST 1151	00,3260 1 6030 0		TCP DANZIG	DONE FOR DP.
1965		00,3261 0 0006 1		EXTEND	ON VECTOR, PUSH DOWN Y AND Z COMPONENTS.
1966	REP 554 LAST 1152	00,3262 3 0160 0		DCA MPAC +3	
1967	REP 17 LAST 1152	00,3263 50 166 0		INDEX PUSHLOC	
1968		00,3264 51+775 0		DXCH 0 -4	
1969		00,3265 0 0006 1		EXTEND	
1970	REP 555 LAST 1152	00,3266 3 0162 1		DCA MPAC +5	
1971	REP 16 LAST 1152	00,3267 50 166 0		INDEX PUSHLOC	
1972		00,3270 51+777 1		DXCH 0 -2	
1973	REP 46 LAST 1152	00,3271 1 6030 0		TCP DANZIG	
1974	REP 556 LAST 1152	00,3272 3 0156 0	TPUSH	CA MPAC +2	
1975	REP 2 LAST 1095	00,3273 1 6523 1		TCP ENDTPUSH +2	RVO - RETURN IVA QPRBT.
1976	REP 30 LAST 1150	00,3274 50 120 1	RVO	INDEX FIXLOC	
1977	REP 18 LAST 1098	00,3275 3 0052 0		CA QPRET	
1978	REP 21 LAST 1110	00,3276 54 117 1		TS POLISH	
1979	REP 5 LAST 1099	00,3277 1 6621 0		TCP GOTO +4	(ASSUME QPRET POINTS TO FIXED ONLY.)

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P1980 THE FOLLOWING SUBROUTINES ARE USED IN SQUARING MPAC, IN BOTH THE SCALAR AND VECTOR SENSE. THEY ARE  
 R1982 SPECIAL CASES OF DMPSUB AND DOTSUB, PUT IN TO SAVE SOME TIME.

1983	REP 557	LAST 1152	00,3300 3 0155 0	DSQSUB	CA	MPAC +1	SQUARES THE SCALAR CONTENTS OF MPAC.
1984			00,3301 0 0008 1		EXTEND		
1985			00,3302 7 0000 0		SQUARE		
1986	REP 556	LAST 1153	00,3303 54 156 1		TS	MPAC +2	
1987	REP 234	LAST 1151	00,3304 3 4714 1		CAP	ZERO	
1988	REP 559	LAST 1153	00,3305 58 155 0		XCH	MPAC +1	
1989			00,3308 0 0006 1		EXTEND		
1990	REP 580	LAST 1153	00,3307 7 0154 0		MP	MPAC	
1991			00,3310 20 001 1		DOUBL		AND MAYBE OVERFLOW.
1992	REP 561	LAST 1153	00,3311 20 158 1		DAS	MPAC +1	AND SET A TO NET OVERFLOW.
1993	REP 562	LAST 1153	00,3312 58 154 1		XCH	MPAC	
1994			00,3313 0 0008 1		EXTEND		
1995			00,3314 7 0000 0		SQUARE		
1996	REP 583	LAST 1153	00,3315 20 155 1		DAS	MPAC	
1997	REP 268	LAST 1149	00,3318 0 0002 0		TC	Q	
1998			00,3317 0 0006 1	VSSQSUB	EXTEND		DOTS THE VECTOR IN MPAC WITH ITSELF.
1999	REP 8	LAST 1108	00,3320 22 137 1		QXCH	DOTRET	
2000	REP 2	LAST 1150	00,3321 0 3300 1		TC	DSQSUB	SQUARE THE X COMPONENT.
2001	REP 564	LAST 1153	00,3322 52 160 1		DXCH	MPAC +3	
2002	REP 565	LAST 1153	00,3323 52 155 1		DXCH	MPAC	
2003	REP 99	LAST 1147	00,3324 52 131 0		DXCH	BUP	SO WE CAN END IN DOTSUB.
2004	REP 566	LAST 1153	00,3325 3 0158 0		CA	MPAC +2	
2005	REP 100	LAST 1153	00,3326 54 132 0		TS	BUP +2	
2006	REP 3	LAST 1153	00,3327 0 3300 1		TC	DSQSUB	SQUARE Y COMPONENT.
2007	REP 567	LAST 1153	00,3330 52 156 1		DXCH	MPAC +1	
2008	REP 101	LAST 1153	00,3331 20 132 0		DAS	BUP +1	
2009	REP 568	LAST 1153	00,3332 8 0154 1		AD	MPAC	
2010	REP 102	LAST 1153	00,3333 6 0130 0		AD	BUP	
2011	REP 103	LAST 1153	00,3334 54 130 1		TS	BUP	
2012			00,3335 1 3337 1		TCF	+2	
2013	REP 6	LAST 1145	00,3338 54 121 1		TS	OVPIND	IF OVERFLOW.
2014	REP 589	LAST 1153	00,3337 52 162 0		DXCH	MPAC +5	
2015	REP 570	LAST 1153	00,3340 52 155 1		DXCH	MPAC	
2016	REP 4	LAST 1153	00,3341 0 3300 1		TC	DSQSUB	SQUARE Z COMPONENT.
2017	REP 1		00,3342 1 7154 1		TCF	ENDDOT	END AS IN DOTSUB.

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P2018 DOUBLE PRECISION SQUARE ROOT ROUTINE. TAKE THE SQUARE ROOT OF THE TRIPLE PRECISION (MPAC +2 USED ONLY  
 R2020 IN NORMALIZATION) CONTENTS OF MPAC AND LEAVE THE NORMALIZED RESULT IN MPAC (C(MPAC) GREATER THAN OR EQUAL TO  
 R2022 .5). THE RIGHT SHIFT COUNT (TO UNNORMALIZE) IS LEFT IN MPTEMP.  
 2023 REP 235 LAST 1153 00,3343 3 4714 1 SORTSUB CAP ZERO  
 2024 REP 58 LAST 1151 00,3344 54 135 1 TS MPTEMP START BY ZEROING RIGHT SHIFT COUNT.  
 2025 REP 571 LAST 1153 00,3345 10 154 0 CCS MPAC  
 2026 REP 1 00,3346 1 3404 0 TCP SMPAC+  
 2027 00,3347 1 3351 1 TCP +2  
 2028 REP 1 00,3350 1 3373 1 TOP SORTNEG SEE IF MAG OF ARGUMENT LESS THAN  $10^{-4}$ .  
 2029 REP 572 LAST 1154 00,3351 56 156 0 XCH MPAC +2  
 2030 REP 573 LAST 1154 00,3352 56 155 0 XCH MPAC +1  
 2031 REP 574 LAST 1154 00,3353 54 154 0 TS MPAC  
 2032 REP 15 LAST 905 00,3354 3 4716 0 CAP SEVEN  
 2033 REP 59 LAST 1154 00,3355 54 135 1 TS MPTEMP AUGMENT RIGHT SHIFT COUNTER.  
 2034 REP 575 LAST 1154 00,3356 10 154 0 CCS MPAC SEE IF MPAC NOW PNZ.  
 2035 REP 2 LAST 1154 00,3357 1 3404 0 TCP SMPAC+  
 2036 00,3358 1 3362 1 TCP +2  
 2037 REP 1 00,3361 1 3376 1 TCP ZEROANS NEGATIVE BUT LESS THAN  $10^{-4}$  IN MAG.  
 2038 REP 576 LAST 1154 00,3362 56 155 0 XCH MPAC +1  
 2039 REP 577 LAST 1154 00,3363 54 154 0 TS MPAC  
 2040 REP 16 LAST 1154 00,3364 3 4716 0 CAP SEVEN  
 2041 REP 60 LAST 1154 00,3365 26 135 1 ADS MPTEMP AUGMENT RIGHT SHIFT COUNTER.  
 2042 REP 578 LAST 1154 00,3366 10 154 0 CCS MPAC  
 2043 REP 3 LAST 1154 00,3367 1 3404 0 TCP SMPAC+  
 2044 REP 269 LAST 1153 00,3370 0 0002 0 TC Q  
 2045 REP 2 LAST 1154 00,3371 1 3376 1 TCP ZEROANS  
 2046 REP 1 00,3372 1 3452 0 TCP FIXROOT  
 2047 REP 314 LAST 1152 00,3373 10 000 0 SORTNEG CCS A  
 2048 REP 1 00,3374 1 3402 0 TCP SORTABRT  
 2049 REP 579 LAST 1154 00,3375 10 155 1 CCS MPAC +1  
 2050 REP 236 LAST 1154 00,3376 3 4714 1 ZEROANS CAP ZERO  
 2051 REP 2 LAST 1154 00,3377 1 3452 0 TCP FIXROOT  
 2052 REP 2 LAST 1154 00,3400 1 3402 0 TCP SORTABRT  
 2053 REP 3 LAST 1154 00,3401 1 3452 0 TCP FIXROOT  
 2054 REP 3 LAST 367 00,3402 0 5622 1 SORTABRT TC POODOO  
 2055 00,3403 01302 1 OCT 1302

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2056	REP 1	00,3404 8 2444 1	SMPAC+	AD	-1/2+2	SEE IF ARGUMENT GREATER THAN OR EQUAL TO .5.
2057		00,3405 0 0008 1		EXTEND		IF SO, SEE IF LESS THAN .25.
2058	REP 1	00,3406 8 3455 0		BZMP	SRTEST	
2059	REP 580	LAST 1154	00,3407 52 155 1	DXCH	MPAC	WE WILL TAKE THE SQUARE ROOT OF MPAC/2.
2080	REP 25	LAST 1138	00,3410 22 021 1	LXCH	SR	SHIFT RIGHT 1 AND GO TO THE SQRT ROUTINE
2081			00,3411 0 0008 1	EXTEND		
2082	REP 16	LAST 1136	00,3412 7 4875 0	MP	HALF	
2083	REP 581	LAST 1155	00,3413 52 155 1	DXCH	MPAC	
2084	REP 26	LAST 1155	00,3414 58 021 1	XCH	SR	
2085	REP 582	LAST 1155	00,3415 28 155 1	ADS	MPAC +1	GUARANTEED NO OVERFLOW.
2086	REP 1	00,3416 3 2314 0	ARGHI	CAP	SLOPENI	ARGUMENT BETWEEN .25 AND .5. GET A LINEAR APPROXIMATION FOR THIS RANGE.
2087		00,3417 0 0008 1		EXTEND		
2088	REP 583	LAST 1155	00,3420 7 0154 0	MP	MPAC	X0/2 = (MPAC/2)(SLOPENI) + BIASHI/2.
2089	REP 1	00,3421 6 2588 0		AD	BIASHI	
2070	REP 104	LAST 1153	00,3422 54 130 1	+4	TS BUP	X0/2 (ARGLO ENTERS HERE).
2071	REP 584	LAST 1155	00,3423 3 0154 1	CA	MPAC	SINGLE-PRECISION THROUGHOUT.
2072			00,3424 22 007 0	ZL		
2073			00,3425 0 0008 1	EXTEND		
2074	REP 105	LAST 1155	00,3426 10 130 1	DV BUP	(MPAC/2)/(X0/2)	
2075			00,3427 0 0008 1	EXTEND		
2078	REP 17	LAST 1155	00,3430 7 4875 0	MP	HALF	
2077	REP 108	LAST 1155	00,3431 28 130 1	ADS	BUP	X1 = X0/2 + .5(MPAC/2)/(X0/2).
2078			00,3432 0 0008 1	EXTEND		
2079	REP 18	LAST 1155	00,3433 7 4875 0	MP	HALF	
2080	REP 585	LAST 1155	00,3434 52 155 1	DXCH	MPAC	
2081			00,3435 0 0008 1	EXTEND		
2082	REP 107	LAST 1155	00,3436 10 130 1	DV BUP		
2063	REP 108	LAST 1155	00,3437 54 131 0	TS BUP +1		
2084	REP 237	LAST 1154	00,3440 3 4714 1	CAP ZERO		SAVE MAJOR PART OF QUOTIENT.
2085	REP 193	LAST 1147	00,3441 56 001 0	XCH L		FORM MINOR PART OF QUOTIENT USING (REMAINDER,0).
2088			00,3442 0 0008 1	EXTEND		
2087	REP 109	LAST 1155	00,3443 10 130 1	DV BUP		
2088	REP 194	LAST 1155	00,3444 54 001 1	TS L		IN PREPARATION FOR DAS.
2069	REP 110	LAST 1155	00,3445 3 0131 1	CA BUP +1		
2090	REP 586	LAST 1155	00,3446 20 155 1	DAS MPAC		X2 = X1/2 + (MPAC/2)X1
2091			00,3447 0 0006 1	EXTEND		OVERFLOWS IF ARG. NEAR POSMAX.
2092	REP 1	00,3450 1 3454 0		BZP	TCQBNK00	
2093	REP 34	LAST 1140	00,3451 3 4872 0	CAP	POSMAX	
2094	REP 587	LAST 1155	00,3452 54 154 0	FIXROOT	TS	
2095	REP 588	LAST 1155	00,3453 54 155 1	TS	MPAC +1	
2096	REP 270	LAST 1154	00,3454 0 0002 0	TCQBNK00	Q	RETURN TO CALLER TO UNNORMALIZE, ETC.

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2107	REP	6	LAST	992	00,3455	6 4676 1	SRTEST	AD	QUARTER	ARGUMENT WAS LESS THAN .5, SEE IF LESS
2108					00,3456	0 0006 1		EXTEND		THAN .25.
2109	REP	1			00,3457	6 3501 0		B2MP	SORTINORM	IF SO, BEGIN NORMALIZATION.
2110	REP	589	LAST	1155	00,3460	52 155 1		DXCH	MPAC	IF BETWEEN .5 AND .25, SHIFT RIGHT 1 AND
2101	REP	27	LAST	1155	00,3461	22 021 1		LXCH	SR	START AT AR0L0.
2102					00,3462	0 0006 1		EXTEND		
2103	REP	19	LAST	1155	00,3463	7 4675 0		MP	HALP	
2104	REP	590	LAST	1156	00,3464	52 155 1		DXCH	MPAC	
2105	REP	28	LAST	1156	00,3465	56 021 1		XCH	SR	
2106	REP	591	LAST	1156	00,3466	26 155 1		ADS	MPAC +1	NO OVERFLOW.
2107	REP	1			00,3467	3 3007 0	ARGLO	CAP	SLOPELO	(NORMALIZED) ARGUMENT BETWEEN .125 AND
2108					00,3470	0 0000 1		EXTEND		.25
2109	REP	592	LAST	1156	00,3471	7 0154 0		MP	MPAC	
2110	REP	1			00,3472	6 2270 0		AD	BIASLO	
2111	REP	1			00,3473	1 3422 1		TOP	ARGLI +4	BEGIN SQUARE ROOT.
2112					00,3474	0 0006 1	SORTINM2	EXTEND		SHIFT LEFT 2 AND INCREMENT RIGHT SHIFT
2113	REP	593	LAST	1156	00,3475	3 0156 0		DCA	MPAC +1	COUNT (FOR TERMINAL UNNORMALIZATION).
2114	REP	594	LAST	1156	00,3476	20 156 1		DAS	MPAC +1	
2115	REP	595	LAST	1156	00,3477	6 0154 1		AD	MPAC	
2116	REP	596	LAST	1156	00,3500	26 154 0		ADS	MPAC	(NO OVERFLOW).
2117	REP	61	LAST	1154	00,3501	24 135 0	SORTINORM	INCR	MPTEMP	PIRST TIME THROUGH, JUST SHIFT LEFT 1
2118					00,3502	0 0006 1		EXTEND		(PUTS IN EFFECTIVE RIGHT SHIFT SINCE
2119	REP	597	LAST	1156	00,3503	3 0156 0		DCA	MPAC +1	WE WANT MPAC/2).
2120	REP	598	LAST	1156	00,3504	20 156 1		DAS	MPAC +1	
2121	REP	599	LAST	1156	00,3505	6 0154 1		AD	MPAC	
2122	REP	600	LAST	1156	00,3506	26 154 0		ADS	MPAC	
2123					00,3507	6 0000 1		DOUBLE		(AGAIN NO OVERFLOW).
2124	REP	19	LAST	373	00,3510	54 022 0		TS	CYL	
2125	REP	20	LAST	1156	00,3511	10 022 0	NORMTEST	CCS	CYL	SPR IF ARGUMENT NOW NORMALIZED AT
2126	REP	21	LAST	1156	00,3512	10 022 0		CCS	CYL	GREATER THAN .125.
2127	REP	1			00,3513	1 3474 1		TOP	SORTINM2	NO - SHIFT LEFT 2 MORE AND TRY AGAIN.
2128	REP	2	LAST	1156	00,3514	1 3416 0		TOP	ARGLI	YES - NOW BETWEEN .5 AND .25.
2129	REP	1			00,3515	1 3467 0		TOP	ARGLO	ARGUMENT NOW BETWEEN .25 AND .125.

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P2130 TRIGONOMETRIC FUNCTION PACKAGE.

R2131 THE FOLLOWING TRIGONOMETRIC FUNCTIONS ARE AVAILABLE AS INTERPRETIVE OPERATIONS:

R2133 1. SIN COMPUTES  $(1/2)\sin(2 \pi MPAC)$ .  
 R2134 2. COS COMPUTES  $(1/2)\cos(2 \pi MPAC)$ .  
 R2135 3. ASIN COMPUTES  $(1/2\pi)\arcsin(2 MPAC)$ .  
 R2136 4. ACOS COMPUTES  $(1/2\pi)\arccos(2 MPAC)$ .

R2137 SIN-ASIN AND COS-ACOS ARE MUTUALLY INVERSE, IE  $\sin(\text{ASIN}(X)) = X$ .

2136 REP 4 LAST 1151 00,3516 0 8872 1 COSINE TC BRANCH  
 2139 00,3517 1 3522 0 TCP +3  
 2140 REP 1 00,3520 1 3525 1 TCP PRESINE  
 2141 REP 2 LAST 1157 00,3521 1 3525 1 TCP PRESINE

FINDS COSINE USING THE IDENTITY  
 $\cos(X) = \sin(\pi/2 - \text{ABS}(X))$ .

2142 00,3522 0 0008 1 +3 EXTEND  
 2143 REP 601 LAST 1156 00,3523 4 0155 1 DCS MPAC  
 2144 REP 602 LAST 1157 00,3524 .52 155 1 DXCH MPAC

2145 REP 7 LAST 1156 00,3525 3 4676 1 PRESINE CAF QUARTER  
 2146 REP 603 LAST 1157 00,3526 26 154 0 ADS MPAC  
 2147 REP 604 LAST 1157 00,3527 52 155 1 SINE DXCH MPAC  
 2148 00,3530 20 001 1 DDQBL  
 2149 00,3531 54 000 0 OVSK  
 2150 00,3532 1 3535 0 TCP +3

PI/2 SCALED.

DOUBLE ARGUMENT.

SEE IF OVERFLOW PRESENT.  
 IF NOT, ARGUMENT OK AS IS.

2151 00,3533 0 0008 1 EXTEND  
 2152 00,3534 4 0001 1 DCOM

IP SO, WE LOST (OR GAINED) PI, SO  
 COMPLEMENT MPAC USING THE IDENTITY  
 $\sin(X-(+)\pi) = \sin(-X)$ .

A2153 2154 REP 605 LAST 1157 00,3535 52 155 1 +3 DXCH MPAC  
 2155 REP 606 LAST 1157 00,3536 3 0154 1 CA MPAC  
 2156 00,3537 6 0000 1 DOUBLE  
 2157 REP 195 LAST 1155 00,3540 54 001 1 TS L  
 2158 REP 1 00,3541 1 3552 1 TCP SN1

SEE IF ARGUMENT GREATER THAN .5 IN  
 MAGNITUDE. IF SO, REDUCE IT TO LESS THAN  
 $.5 (+-\pi/2 \text{ SCALED})$  AS FOLLOWS:

2159 REP 315 LAST 1154 00,3542 50 000 1 INDEX A  
 2160 REP 7 LAST 1052 00,3543 3 4674 0 CAF NEG1/2 +1  
 2161 00,3544 8 0000 1 DOUBLE  
 2162 00,3545 0 0008 1 EXTEND  
 2163 REP 607 LAST 1157 00,3546 60 154 1 SU MPAC  
 2164 REP 608 LAST 1157 00,3547 54 154 0 TS MPAC  
 2165 REP 609 LAST 1157 00,3550 4 0155 1 CS MPAC +1  
 2166 REP 610 LAST 1157 00,3551 54 155 1 TS MPAC +1

IP POSITIVE, FORM PI - X, IP NEGATIVE  
 USE -PI - X.

GUARANTEED NO OVERFLOW.

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2167		00,3552 0 0006 1	SN1	EXTEND	SET UP TO EVALUATE HASTINGS POLYNOMIAL
2166	REP 611	LAST 1157	00,3553 3 0155 0	DCA MPAC	
2169	REP 17	LAST 1143	00,3554 52 134 0	DXCH BUF2	
2170	REP 5	LAST 1153	00,3555 0 3300 1	TC DSQSUB	SQUARE MPAC.
2171	REP 5	LAST 649	00,3556 0 7171 1	TC POLY	EVALUATE FOURTH ORDER POLYNOMIAL.
2172			00,3557 00003 1	DEC 3	
2173			00,3560 14441 0	2DEC +.3926990796	
2174			00,3561 37325 1		
2174			00,3562 53250 0	2DEC -.8459637111	
2174			00,3563 60764 1		
2175			00,3564 12146 1	2DEC +.318756717	
2175			00,3565 21276 1		
2176			00,3566 75466 1	2DEC -.074760249	
2176			00,3567 71471 0		
2177			00,3570 00236 0	2DEC +.009694966	
2177			00,3571 32757 0		
2178	REP 1		00,3572 3 2470 0	CAP LBUP2	MULTIPLY BY ARGUMENT AND SHIFT LEFT 2.
2179	REP 19	LAST 1119	00,3573 0 7055 0	TC DMPSUB -1	
2180			00,3574 0 0006 1	EXTEND	
2181	REP 612	LAST 1158	00,3575 3 0156 0	DCA MPAC +1	
2182	REP 613	LAST 1156	00,3576 20 156 1	DAS MPAC +1	
2183	REP 614	LAST 1156	00,3577 6 0154 1	AD MPAC	
2184	REP 615	LAST 1156	00,3600 26 154 0	ADS MPAC	
2185			00,3601 0 0006 1	EXTEND	
2186	REP 616	LAST 1156	00,3602 3 0156 0	DCA MPAC +1	
2187	REP 617	LAST 1158	00,3603 20 156 1	DAS MPAC +1	
2188	REP 618	LAST 1156	00,3604 6 0154 1	AD MPAC	
2189	REP 619	LAST 1156	00,3605 26 154 0	ADS MPAC	
2190	REP 47	LAST 1152	00,3606 1 6030 0	TCP DANZIG	
					NEITHER SHIFT OVERFLOWS.

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P2191 ARCSIN/ARCCOS ROUTINE.

2192	REP	1	00,3807 3 3630 1	ARCSIN	CAP	LASINEX	COMPUTE ARCSIN BY USING THE IDENTITY ARCSIN(X) = PI/2 - ARCCOS(X).
2193			00,3810 1 3612 0		TCP	+2	(EXITS IMMEDIATELY).
2194	REP	1	00,3811 3 3712 0	ARCCOS	CAP	LDANZIG	TEST SIGN OF INPUT.
2195	REP	1	00,3812 54 136 1		TS	ESCAPE	START IMMEDIATELY IF POSITIVE.
2196	REP	5 LAST 1157	00,3813 0 6672 1		TC	BRANCH	ARCCOS(0) = PI/2 = .25.
2197	REP	1	00,3814 1 3624 0		TCP	ACOSST	IF NEGATIVE, USE THE IDENTITY
2198	REP	1	00,3815 1 3728 0		TCP	ACOSZERO	ARCCOS(X) = PI - ARCCOS(-X), FORCING
2199			00,3816 0 0008 1	EXTEND			ARGUMENT POSITIVE.
2200	REP 620	LAST 1156	00,3817 4 0155 1		DCS	MPAC	SET EXIT TO DO ABOVE BEFORE
2201	REP 621	LAST 1159	00,3820 52 155 1		DXCH	MPAC	ARCSIN/ARCCOS CONSIDERATIONS.
2202	REP	1	00,3821 3 3731 1		CAP	TCSUBTR	
2203	REP	2 LAST 1159	00,3822 56 136 0		XCH	ESCAPE	
2204	REP	1	00,3823 54 137 0		TS	ESCAPE2	
2205	REP 20	LAST 1156	00,3824 4 4675 0	ACOSST	CS	HALF	TEST MAGNITUDE OF INPUT.
2206	REP 622	LAST 1159	00,3825 6 0154 1		AD	MPAC	
2207	REP 316	LAST 1157	00,3826 10 000 0		CCS	A	THIS IS PROBABLY AN OVERFLOW CASE.
2208	REP	1	00,3827 1 3720 0		TCP	ACOSOVF	
2209	REP	1	00,3830 1 3706 1	LASINEX	TCP	ASINEX	
2210	REP	1	00,3831 1 3841 0		TCP	ACOSST2	NO OVERFLOW - PROCEED.
2211	REP 623	LAST 1159	00,3832 10 155 1		CCS	MPAC +1	
2212	REP 238	LAST 1155	00,3833 3 4714 1		CAP	ZERO	IF MAJOR PART IS .5, CALL ANSWER 0
2213	REP	1	00,3834 1 3838 0		TCP	ACOS=0	UNLESS MINOR PART NEGATIVE.
2214	REP	2 LAST 1159	00,3835 1 3841 0		TCP	ACOSST2	
2215	REP 624	LAST 1159	00,3836 54 155 1	ACOS=0	TS	MPAC +1	
2216	REP 625	LAST 1159	00,3837 54 154 0		TS	MPAC	
2217	REP 3	LAST 1159	00,3840 0 0136 0		TC	ESCAPE	
2218			00,3841 0 0008 1	ACOSST2	EXTEND		NOW THAT ARGUMENT IS IN PROPER RANGE,
2219	REP 626	LAST 1159	00,3842 4 0155 1		DCS	MPAC	BEGIN COMPUTATION. USE HASTINGS
2220	REP 21	LAST 1159	00,3843 8 4875 1		AD	HALF	APPROXIMATION ARCCOS(X) = SQRT(1-X)P(X)
2221	REP 627	LAST 1159	00,3844 52 155 1		DXCH	MPAC	IN A SCALED VERSION WHERE P(X) IS A
2222	REP 16	LAST 1156	00,3845 52 134 0		DXCH	BUP2	SEVENTH ORDER POLYNOMIAL.
2223	REP 3	LAST 1151	00,3846 0 3343 0		TC	SORTSUB	RETURNS WITH NORMALIZED SQUARE ROOT.
2224	REP 62	LAST 1156	00,3847 10 135 1		CCS	MPTEMP	
2225	REP 1		00,3850 1 3713 0		TCP	ACOSSHR	SEE IF UN-NORMALIZATION REQUIRED.
							IF SO.

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2226	REF 628	LAST 1159	00,3851	52 155 1	ACOS3	DXCH	MPAC	SET UP FOR POLYNOMIAL EVALUATION.
2227	REF 19	LAST 1159	00,3852	52 134 0		DXCH	BUF2	
2228	REF 629	LAST 1160	00,3853	52 155 1		DXCH	MPAC	
2229	REF 6	LAST 1158	00,3854	0 7171 1		TC	POLY	
2230			00,3855	00006 1		DEC	6	
2231			00,3856	13240 0		2DEC	+.353553385	COEFFICIENTS ARE C 2(+I)/PI*SQRT(2) WHERE
2231			00,3857	23630 0				I
2232			00,3860	74721 0		2DEC*	-.0483017006	B+1*
2232			00,3861	47775 1				
2233			00,3862	02440 0		2DEC*	+.0200273085	B+2* WHERE C STANDS FOR ORIGINAL COEFFS.
2233			00,3863	20237 0				
2234			00,3864	75087 1		2DEC*	-.0112931863	B+3*
2234			00,3865	70742 1				
2235			00,3868	03436 0		2DEC*	+.00895311612	B+4*
2235			00,3867	28758 1				
2236			00,3870	74037 0		2DEC*	-.00384817957	B+5*
2236			00,3871	57840 1				
2237			00,3872	03048 0		2DEC*	+.001501297738	B+6*
2237			00,3873	07143 0				
2238			00,3874	76854 1		2DEC*	-.000284160334	B+7*
2238			00,3875	42244 0				
2239	REF 2	LAST 1158	00,3876	3 2470 0		CAP	LRUP2	DO FINAL MULTIPLY AND GO TO ANY
2240	REF 20	LAST 1158	00,3877	0 7055 0		TC	DMPSUB -1	EPILOGUE SEQUENCES.
2241	REF 4	LAST 1159	00,3700	0 0136 0		TC	ESCAPE	
2242			00,3701	0 0006 1	SUBTR	EXTEND		EPILOGUE FOR NEGATIVE INPUTS TO ARCCOS.
2243	REF 630	LAST 1160	00,3702	4 0155 1		DCS	MPAC	
2244	REF 22	LAST 1159	00,3703	6 4875 1		AD	HALF	FORMS PI - ARCCOS(-X) = ARCCOS(X).
2245	REF 831	LAST 1160	00,3704	52 155 1		DXCH	MPAC	
2246	REF 2	LAST 1159	00,3705	0 0137 1		TC	ESCAPE2	GO TO POSSIBLE ARCSIN EPILOGUE.
2247			00,3706	0 0006 1	ASINEX	EXTEND		
2248	REF 632	LAST 1160	00,3707	4 0155 1		DCS	MPAC	ARCSIN EPILOGUE - GET ARCSIN(X)
2249	REF 6	LAST 1157	00,3710	6 4876 1		AD	QUARTER	= PI/2 - ARCCOS(X).
2250	REF 633	LAST 1160	00,3711	52 155 1		DXCH	MPAC	
2251	REF 46	LAST 1158	00,3712	1 6030 0	LDANZIG	TCF	DANZIG	

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2252	REF 317	LAST 1159	00,3713	50 000 1	ACOSSH	INDEX	A
2253	REF 68	LAST 1148	00,3714	3 4675 1	CAF	BIT14	
2254	REF 63	LAST 1159	00,3715	54 135 1	TS	MPTEMP	
2255	REF 4	LAST 1125	00,3716	0 2073 1	TC	VSHRRND	
2256	REF 1		00,3717	1 3651 1	TCP	ACOS3	
2257			00,3730	0 0008 1	ACOSOVP	EXTEND	
2258	REF 2	LAST 1159	00,3721	1 3636 0	BZF	ACOS=0	
2259	REF 33	LAST 782	00,3722	0 5537 0	ACOSABRT	TC	ALARM
22591			00,3723	01301 1	OCT	1301	
2260	REF 239	LAST 1159	00,3724	3 4714 1	CAP	ZERO	
22601	REF 3	LAST 1161	00,3725	1 3636 0	TCP	ACOS=0	
2261	REF 9	LAST 1160	00,3726	3 4676 1	ACOSZERO	CAF	QUARTER
2262	REF 4	LAST 1161	00,3727	1 3637 1	TCP	ACOS=0	+1
2263			00,3730	77763 0	NEG12	DEC	-12
2264	REF 1		00,3731	1 3701 0	TCSUBTR	TCP	SUBTR

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THE SHIFT RIGHT IS LESS THAN 14 SINCE  
THE INPUT WAS NON-ZERO DP.DP SHIFT RIGHT AND ROUND.  
PROCEED.IF MAJOR PART WAS ONLY 1 MORE THAN .5,  
CALL ANSWER ZERO.IF OVERFLOW, CALL ANSWER ZERO BUT  
SOUND AN ALARM.ACOS(0) = PI/2.  
SET MPAC AND EXIT VIA ESCAPE.

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P2265 THE FOLLOWING INSTRUCTIONS ARE AVAILABLE FOR SETTING, MODIFYING, AND BRANCHING ON INDEX REGISTERS:

R2267 1. AXT ADDRESS TO INDEX TRUE.  
R2268 1. AXC ADDRESS TO INDEX COMPLEMENTED.  
R2269 3. LXA LOAD INDEX FROM ERASABLE.  
R2270 4. LXC LOAD INDEX COMPLEMENTED FROM ERASABLE.  
R2271 5. SXA STORE INDEX IN ERASABLE.  
R2272 6. XCHX EXCHANGE INDEX REGISTER WITH ERASABLE.

R2273 7. INCR INCREMENT INDEX REGISTER.  
R2274 8. XAD ERASABLE ADD TO INDEX REGISTER.  
R2275 9. XSU ERASABLE SUBTRACT FROM INDEX REGISTER.

R2276 10. TIX BRANCH ON INDEX REGISTER AND DECREMENT.  
R2277 01,2371 BANK 01

	REF	1		COUNT	01/INTER		
2278	REF	1					
2279	REF	1	01,2371 0 2466 1 AXT	TC	TAGSUB	SELECT APPROPRIATE INDEX REGISTER.	
2280	REF	22 LAST 1152	01,2372 3 0117 0	CA	POLISH		
2281	REF	4 LAST 1081	01,2373 50 130 0 XSTORE2	INDEX	INDEXLOC	CONTAINS C(FIXLOC) OR C(FIXLOC)+1.	
2282	REF	50 LAST 1091	01,2374 54 046 1	TS	X1		
2283	REF	49 LAST 1160	01,2375 1 6030 0	TCP	DANZIG		
2284	REF	2 LAST 1162	01,2376 0 2466 1 AXC	TC	TAGSUB		
2285	REF	23 LAST 1162	01,2377 4 0117 1	CS	POLISH		
2286	REF	1	01,2400 0 2373 1	TC	XSTORE		
2287	REF	1	01,2401 0 2454 0 LXA	TC	15ADRERS	LOAD INDEX REGISTER FROM ERASABLE.	
2288	REF	24 LAST 1162	01,2402 50 117 0	INDEX	POLISH		
2289			01,2403 3 0000 1	CA	0		
2290	REF	2 LAST 1162	01,2404 1 2373 0	TCP	XSTORE		
2291	REF	2 LAST 1162	01,2405 0 2454 0 LXC	TC	15ADRERS	LOAD NDY REG FROM ERASABLE COMPLEMENTED.	
2292	REF	25 LAST 1162	01,2406 50 117 0	INDEX	POLISH		
2293			01,2407 4 0000 0	CS	0		
2294	REF	3 LAST 1162	01,2410 1 2373 0	TCP	XSTORE		
2295	REF	3 LAST 1162	01,2411 0 2454 0 SXA	TC	15ADRERS	STORE INDEX REGISTER IN ERASABLE.	
2296	REF	5 LAST 1162	01,2412 50 130 0	INDEX	INDEXLOC		
2297	REF	51 LAST 1162	01,2413 3 0046 0	CA	X1		
2298	REF	26 LAST 1162	01,2414 50 117 0 MSTORE1	INDEX	POLISH		
2299			01,2415 54 000 0	TS	0		
2300	REF	50 LAST 1162	01,2416 1 6030 0	TCP	DANZIG		

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2301	REP	4	LAST	1162	01,2417	0 2454 0	XCH	TC	15ADRBR3	EXCHANGE INDEX REGISTER WITH ERASABLE.
2302	REP	27	LAST	1162	01,2420	50 117 0		INDEX	POLISH	
2303					01,2421	3 0000 1		CA	0	
2304	REP	6	LAST	1162	01,2422	50 130 0		INDEX	INDEXLOC	
2305	REP	52	LAST	1162	01,2423	56 046 0		XCH	X1	
2306	REP	1			01,2424	1 2414 0		TOP	MSTORE1	
2307	REP	5	LAST	1163	01,2425	0 2454 0	XAD	TC	15ADRBR3	ADD ERASABLE TO INDEX REGISTER.
2308	REP	28	LAST	1163	01,2426	50 117 0		INDEX	POLISH	
2309					01,2427	3 0000 1		CA	0	
2310	REP	7	LAST	1163	01,2430	50 130 0	XAD2	INDEX	INDEXLOC	
2311	REP	53	LAST	1163	01,2431	26 046 1		ADS	X1	IGNORING OVERFLOWS.
2312	REP	51	LAST	1162	01,2432	1 6030 0		TOP	DANZIG	
2313	REP	3	LAST	1162	01,2433	0 2466 1	INCR	TC	TAGS1R	INCREMENT INDEX REGISTER.
2314	REP	29	LAST	1163	01,2434	3 0117 0		CA	POLISH	
2315	REP	1			01,2435	1 2430 0		TOP	XAD2	
2316	REP	6	LAST	1163	01,2436	0 2454 0	XSU	TC	15ADRBR3	SUBTRACT ERASABLE FROM INDEX REGISTER.
2317	REP	30	LAST	1163	01,2437	50 117 0		INDEX	POLISH	
2318					01,2440	4 0000 0		CS	0	
2319	REP	2	LAST	1163	01,2441	1 2430 0		TOP	XAD2	BRANCH AND DECREMENT ON INDEX.
2320	REP	4	LAST	1163	01,2442	0 2466 1	TIX	TC	TAGS1R	
2321	REP	8	LAST	1163	01,2443	50 130 0		INDEX	INDEXLOC	
2322	REP	37	LAST	691	01,2444	4 0050 0		CS	S1	
2323	REP	9	LAST	1163	01,2445	50 130 0		INDEX	INDEXLOC	
2324	REP	54	LAST	1163	01,2446	6 0046 0		AD	X1	
2325					01,2447	0 0008 1		EXTEND		NO OPERATION IF DECREMENTED INDEX IS
2326	REP	52	LAST	1163	01,2450	6 6030 1		BZMP	DANZIG	NEGATIVE OR ZERO.
2327	REP	10	LAST	1163	01,2451	50 130 0	DOTIXBR	INDEX	INDEXLOC	IGNORING OVERFLOWS.
2328	REP	55	LAST	1163	01,2452	56 046 0		XCH	X1	
2329	REP	6	LAST	1152	01,2453	1 6615 1		TOP	GOTO	DO THE BRANCH USING THE CADR IN POLISH.

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P2330 SUBROUTINE TO CONVERT AN ERASABLE ADDRESS (11 BITS) TO AN EBANK SETTING AND SUBADDRESS.

2332	REP	31	LAST 1163	01,2454	4 0117 1	15ADR2RS CS	POLISH	
2333	REP	3	LAST 1091	01,2455	6 4727 1	AD	DEC45	
2334	REP	318	LAST 1161	01,2456	10 000 0	CCS	A	DOES THE ADDRESS POINT TO THE WORK AREA?
2335	REP	31	LAST 1152	01,2457	3 0120 1	CA	PIXLOC	YES. ADD PIXLOC. EBANK OK AS IS.
2336				01,2460	1 2465 0	TC	+5	

2337	REP	6	LAST 1091	01,2461	3 4744 1	CA	OCT1400	NO. SET EBANK & MAKE UP SUBADDRESS.
2338	REP	32	LAST 1164	01,2462	56 117 0	XCH	POLISH	

2339	REP	50	LAST 1099	01,2463	54 003 0	TS	EBANK	
2340	REP	12	LAST 1099	01,2464	7 4373 0	MASK	LOW8	

2341	REP	33	LAST 1164	01,2465	26 117 1	ADS	POLISH	FALL INTO TAGSUB, AND RETURN VIA Q.
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R2342 SUBROUTINE WHICH SETS THE ADDRESS OF THE SPECIFIED INDEX IN INDEXLOC. (ACTUALLY, THE ADDRESS -38D.)

2344	REP	32	LAST 1164	01,2466	3 0120 1	TAGSUB	CA	PIXLOC
2345	REP	11	LAST 1163	01,2467	54 130 1		TS	INDEXLOC

2346	REP	36	LAST 1131	01,2470	10 020 1	CCS	CYR	BIT 15 SPECIFIES INDEX.
2347	REP	12	LAST 1164	01,2471	24 130 0	INCR	INDEXLOC	0 MEANS USE X2.

2348	REP	271	LAST 1155	01,2472	0 0002 0	TC	Q	
2349	REP	272	LAST 1164	01,2473	0 0002 0	TC	Q	1 FOR X1.

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## P2350 MISCELLANEOUS OPERATION CODES WITH DIRECT ADDRESSES. INCLUDED HERE ARE:

R2352 1. ITA STORE QPRET (RETURN ADDRESS) IN ERASABLE.  
 R2354 2. CALL CALL A SUBROUTINE, LEAVING RETURN IN QPRET.  
 R2356 3. RTB RETURN TO BASIC LANGUAGE AT THE GIVEN ADDRESS.  
 R2358 4. BHIZ BRANCH IF THE HIGH ORDER OF MPAC IS ZERO (SINGLE PRECISION).  
 R2360 5. BOV BRANCH ON OVERFLOW.  
 R2361 6. GOTO SIMPLE SEQUENCE CHANGE.

2362	REF	37	LAST	1164	01,2474	10 020 1	RTB/BHIZ	CCS	CYR		
2363	REF	34	LAST	1164	01,2475	3 0117 0	RTB	CA	MPOLISH		
2364	REF	5	LAST	731	01,2476	0 4560 0		TC	SWCALL	-1	SO A STC QS FROM ROUTINE LEADS TO DANZIG
2365	REF	634	LAST	1160	01,2477	10 154 0	BHIZ	CCS	MPAC		
2366	REF	53	LAST	1163	01,2500	1 6030 0		TC	DANZIG		
2367	REF	1	LAST	1163	01,2501	1 6615 1		TC	GOTO		
2368	REF	54	LAST	1165	01,2502	1 6030 0		TC	DANZIG		
2369	REF	8	LAST	1165	01,2503	1 6615 1		TC	GOTO		
2370	REF	9	LAST	1153	01,2504	10 121 1	BOV(B)	CCS	O/PIND		BRANCH ON OVERFLOW TO BASIC OR INTERP.
2371					01,2505	1 2507 0		TC	+2		
2372	REF	55	LAST	1165	01,2506	1 6030 0		TC	DANZIG		
2373	REF	10	LAST	1165	01,2507	54 121 1		TS	O/PIND		
2374	REF	38	LAST	1165	01,2510	10 020 1		CCS	CYR		
2375	REF	1			01,2511	1 2475 1		TC	RTB		IP BASIC.
2376					01,2512	00360 1	B5TOB8	CC	360		
2377	REF	9	LAST	1165	01,2513	1 6615 1		TC	GOTO		

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2376	REP 39	LAST 1165	01,2514	10 020 1	B2E/GOTO	CCS	CYR	S2E WHICH OP-CODE IS DESIRED.
2379	REP 6	LAST 1159	01,2515	0 6672 1	TC	BRANCH	DO B2E.	
2380	REP 56	LAST 1165	01,2516	1 6030 0	TCP	DANZIG		
2381	REP 10	LAST 1165	01,2517	1 6615 1	TCP	GOTO		
2382	REP 57	LAST 1166	01,2520	1 6030 0	TCP	DANZIG	DO GOTO.	
2383	REP 40	LAST 1166	01,2521	10 020 1	BPL/BMN	CCS	CYR	
2384	REP 1		01,2522	1 2530 1	TC	BPL		
2385			01,2523	12000 1	5B10	DEC	5 B+10	SHIFTS OP CODE IN SWITCH INSTRUCTION ADR
2386	REP 7	LAST 1166	01,2524	0 6672 1	TC	BRANCH		
2387	REP 58	LAST 1166	01,2525	1 6030 0	TCP	DANZIG	DO BMN.	
2388	REP 59	LAST 1166	01,2526	1 6030 0	TCP	DANZIG		
2389	REP 11	LAST 1166	01,2527	1 6615 1	TCP	GOTO	ONLY IF NZ.	
2390	REP 6	LAST 1166	01,2530	0 6672 1	BPL	TC	BRANCH	
2391	REP 12	LAST 1166	01,2531	1 6615 1	TCP	GOTO		
2392	REP 13	LAST 1166	01,2532	1 6615 1	TCP	GOTO	IF POSITIVE OR ZERO.	
2393	REP 60	LAST 1166	01,2533	1 6030 0	TCP	DANZIG		
2394	REP 41	LAST 1166	01,2534	10 020 1	CALL/ITA	CCS	CYR	
2395	REP 1		01,2535	1 6607 1	TC	CALL		
2396	REP 7	LAST 357	01,2536	0 5640 0	TC	CCSHOLE		
2397	REP 7	LAST 1163	01,2537	0 2454 0	TC	15ADRERS		
2398	REP 33	LAST 1164	01,2540	50 120 1	INDEX	FIXLOC		
2399	REP 19	LAST 1152	01,2541	3 0052 0	CA	OPRET		
2400	REP 2	LAST 1163	01,2542	1 2414 0	TCP	MSTORE1		STORE OPRET. (TAGSUB AFTER 15ADRERS IS SLOW IN THIS CASE, BUT SAVES STORAGE.)

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P2401 THE FOLLOWING OPERATIONS ARE AVAILABLE FOR ALTERING AND TESTING INTERPRETIVE SWITCHES'

R2403	00	BONSET	SET A SWITCH AND DO A GOTO IF IT WAS ON.
R2404	01	SETGO	SET A SWITCH AND DO A GOTO.
R2405	02	BOFSET	SET A SWITCH AND DO A GOTO IF IT WAS OFF.
R2406	03	SET	SET A SWITCH.

R2407	04	BONINV	INVERT A SWITCH AND BRANCH IF IT WAS ON.
R2408	05	INVGO	INVERT A SWITCH AND DO A GOTO.
R2409	06	BOFINV	INVERT A SWITCH AND BRANCH IF IT WAS OFF.
R2410	07	INVERT	INVERT A SWITCH.

R2411	10	BONCLR	CLEAR A SWITCH AND BRANCH IF IT WAS ON.
R2412	11	CLROO	CLEAR A SWITCH AND DO A GOTO.
R2413	12	BOFCLR	CLEAR A SWITCH AND BRANCH IF IT WAS OFF.
R2414	13	CLEAR	CLEAR A SWITCH.

R2415	14	BON	BRANCH IF A SWITCH WAS ON.
R2416	16	BOFF	BRANCH IF A SWITCH WAS OFF.

R2417 THE ADDRESS SUPPLIED WITH THE SWITCH INSTRUCTION IS INTERPRETED AS FOLLOWS'

R2419	BITS 1-4	SWITCH BIT NUMBER (1-15).
R2420	BITS 5-8	SWITCH OPERATION NUMBER.
R2421	BITS 9-	SWITCH WORD NUMBER (UP TO 64 SWITCH WORDS).

R2422 THE ADDRESS ITSELF IS MADE UP BY THE YUL SYSTEM ASSEMBLER. THE BRANCH INSTRUCTIONS REQUIRE TWO ADDRESSES, THE SECOND TAKEN AS THE DIRECT (OR INDIRECT IF IN ERASABLE) ADDRESS OF THE BRANCH.

R2424	REF 3 LAST 977	01,2543	3 4721 1	SWITCHES CAF	LOW4	LEAVE THE SWITCH BIT IN SWBIT
2426	REF 35 LAST 1165	01,2544	7 0117 1	MASK	POLISH	
2427	REF 319 LAST 1164	01,2545	50 000 1	INDEX	A	
2428	REF 46 LAST 1151	01,2546	3 4674 0	CAP	BIT15	(NUMBER FROM LEFT TO RIGHT.)
2429	REF 1	01,2547	54 131 0	TS	SWBIT	
2430						
2431	REF 51 LAST 1067	01,2550	3 4704 0	CAP	BIT7	LEAVE THE SWITCH NUMBER IN SWWORD.
2432		01,2551	0 0006 1	EXTEND		
2433	REF 36 LAST 1167	01,2552	7 0117 1	MP	POLISH	
2434	REF 1	01,2553	54 130 1	TS	SWWORD	
2435		01,2554	0 0004 0	IN/INT		DURING SWITCH CHANGE SO RPUIT CAN USE TOO
2436	REF 320 LAST 1167	01,2555	50 000 1	INDEX	A	LEAVE THE SWITCH WORD ITSELF IN L.
2437	REF 49 LAST 798	01,2556	3 0074 1	CA	STATE	
2438	REF 273 LAST 1164	01,2557	54 002 1	TS	Q	Q WILL BE USED AS A CHANNEL.

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2439	REF 31 LAST 1037	01,2560 3 4700 1	CAF	BIT11	
2440		01,2561 0 0006 1	EXTEND		
2441	REF 37 LAST 1167	01,2562 7 0117 1	MP	POLISH	DISPATCH SWITCH BIT OPERATION AS IN BITS
2442	REF 1	01,2563 7 2623 0	MASK	B3TOB4	7-8 OF POLISH.
2443	REF 321 LAST 1167	01,2564 50 000 1	INDEX	A	GETS 4X2-BIT CODE.
2444		01,2565 1 2566 1	TOP	+1	
2445	REF 2 LAST 1167	01,2566 3 0131 1	CA	SWBIT	
2446		01,2567 0 0006 1	EXTEND		00 - SET SWITCH IN QUESTION.
2447	REF 1	01,2570 04 002 1	ROR	OCHAN	
2448	REF 1	01,2571 1 2600 1	TOP	SWSTORE	
2449	REF 3 LAST 1166	01,2572 3 0131 1	CA	SWBIT	
2450		01,2573 0 0006 1	EXTEND		01 - INVERT SWITCH.
2451	REF 2 LAST 1166	01,2574 06 002 0	XROR	OCHAN	
2452	REF 2 LAST 1166	01,2575 1 2600 1	TOP	SWSTORE	
2453	REF 4 LAST 1166	01,2576 4 0131 0	+9D	CS	
2454	REF 274 LAST 1167	01,2577 7 0002 1	MASK	SWBIT	10 - CLEAR.
2455	REF 2 LAST 1167	01,2600 50 130 0	INDEX	0	
2456	REF 50 LAST 1167	01,2601 54 074 0	TS	SWWORD	
			TS	STATE	NEW SWITCH WORD.

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2457			01,2602	0 0003 1	+13D	RELINT		11 - NOOP.
2458	REP 41	LAST 1004	01,2603	3 4676 1		CAP	BIT13	
2459			01,2604	0 0006 1		EXTEND		DISPATCH SEQUENCE CHANGING OR BRANCHING
2460	REP 36	LAST 1168	01,2605	7 0117 1		MP	POLISH	CODE.
2461	REP 2	LAST 1166	01,2606	7 2823 0		MASK	B3TOB4	
2462	REP 322	LAST 1166	01,2607	50 000 1		INDEX	A	
2463			01,2610	1 2811 1		TCP	+1	ORIGINALLY STORED IN BITS 5-8.
2464	REP 275	LAST 1168	01,2611	4 0002 1	+1	CS	Q	00 - BRANCH IF ON.
2465	REP 5	LAST 1166	01,2612	7 0131 0	TEST	MASK	SWBIT	
2466	REP 323	LAST 1169	01,2613	10 000 0		CCS	A	
2467	REP 1		01,2614	1 2824 1		TCP	SWSKIP	
2468	REP 1		01,2615	1 6664 1	+5	TOP	SWBRANCH	01 - GO TO.
2469	REP 2	LAST 1169	01,2616	1 2824 1		TOP	SWSKIP	HERE ONLY ON BIT 15.
2470	REP 8	LAST 1166	01,2617	0 5640 0		TC	CCSHOLE	
2471	REP 9	LAST 1169	01,2620	0 5640 0		TC	CCSHOLE	
2472	REP 276	LAST 1169	01,2621	3 0002 0	+9D	CA	Q	10 - BRANCH IF OFF.
2473	REP 1		01,2622	1 2812 1		TCP	TEST	
2474			01,2623	00014 1	B3TOB4	OCT	0014	
2475	REP 27	LAST 1100	01,2624	24 164 1	SWSKIP	INCR	LOC	
2476	REP 1		01,2543			SW/	EQUALS SWITCHES	
2477	REP 61	LAST 1166	01,2625	1 6030 0	+13D	TCP	DANZIG	11 - NOOP.

## L FIXED-FIXED CONSTANT POOL

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0001	4671	BLOCK 02					
00015	REF 1	COUNT 02/PCONS					
R00016 THE FOLLOWING TABLE OF 18 VALUES IS INDEXED. DO NOT INSERT OR REMOVE ANY QUANTITIES.							
0002	4671	37777 1	DPOSMAX	OCT	37777	MUST PRECEDE POSMAX	
0003	4672	37777 1	POSMAX	OCT	37777		
0004	REF 8 LAST 1157	4673	LIMITS	=	NEG1/2		
0007		4673	57777 1	NEG1/2	OCT	-20000	USED BY SIN ROUTINE (MUST BE TWO LOCATIONS IN FRONT OF BIT14)
R0009	BIT TABLE						
0010	4674	40000 0	BIT15	OCT	40000		
0011	4675	20000 0	BIT14	OCT	20000		
0012	4676	10000 0	BIT13	OCT	10000		
0013	4677	04000 0	BIT12	OCT	04000		
0014	4700	02000 0	BIT11	OCT	02000		
0015	4701	01000 0	BIT10	OCT	01000		
0016	4702	00400 0	BIT9	OCT	00400		
0017	4703	00200 0	BIT8	OCT	00200		
0018	4704	00100 0	BIT7	OCT	00100		
0019	4705	00040 0	BIT6	OCT	00040		
0020	4706	00020 0	BIT5	OCT	00020		
0021	4707	00010 0	BIT4	OCT	00010		
0022	4710	00004 0	BIT3	OCT	00004		
0023	4711	00002 0	BIT2	OCT	00002		
0024	4712	00001 0	BIT1	OCT	00001		
R0025	DO NOT DESTROY THIS COMBINATION, SINCE IT IS USED IN DOUBLE PRECISION INSTRUCTIONS.						
0027	4713	77777 0	NEGO	OCT	-0	MUST PRECEDE ZERO	
0028	4714	00000 1	ZERO	OCT	0	MUST FOLLOW NEGO	
A0029			BIT1	OCT	00001		
A0030			NO_WDS	OCT	2	INTERPRETER	
A0031			OCTAL3	OCT	3	INTERPRETER	
A0032			R3D1	OCT	4	PINBALL	
0033	4715	00005 1	FIVE	OCT	5		
A0034			REVCNT	OCT	6	INTERPRETER	
0035	4716	00007 0	SEVEN	OCT	7		
A0036			BIT4	OCT	00010		
A0037			R2D1	OCT	11	PINBALL	
00375	REF 6 LAST 369	4334	OCT11	=	R2D1	P20S	
A0038			BINCON	DEC	10	PINBALL (OCTAL 12)	
0039		4717	00013 0	ELEVEN	DEC	11	
A0040			OCT14	OCT	14	ALARM AND ABORT (PILLER)	
00401		4720	00015 0	OCT15	OCT	15	
A0041			R1D1	OCT	16	PINBALL	

## L FIXED-FIXED CONSTANT POOL

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0043	4721	00017 1	LOW4	OCT	17	
A0044			BITS5	OCT	00020	PINBALL
A0045			ND1	OCT	21	PINBALL
A0046			VD1	OCT	23	SERVICE ROUTINES
A0047			OCT24	OCT	24	PINBALL
A0048			MD1	OCT	25	
00485	4722	00030 1	BITS445	OCT	30	SERVICE ROUTINES
A0049			OCT31	OCT	31	
0050	4723	00032 0	CALLCODE	OCT	00032	
A0051			LOW5	OCT	37	PINBALL
A0052			33DEC	DEC	33	PINBALL (OCTAL 41)
A0053			34DEC	DEC	34	PINBALL (OCTAL 42)
0054	4724	00045 0	TRUILDPX	DEC	37	BUILDUP FOR CONVIENCE IN DAPTESTING
0055	4725	00048 0	TDECAYPX	DEC	38	CONVENIENCE FOR DAPTESTING
A0056			BIT8	OCT	00040	
0057	4726	00050 1	OCT50	OCT	50	
0058	4727	00055 1	DEC45	DEC	45	
0059	4730	00060 1	SUPER011	OCT	60	
0060	4731	00082 0	.5SEC	DEC	50	
A0081			BIT7	OCT	00100	
0082	REF 52 LAST 1167	4704	SUPER100 =	BIT7		BITS FOR SUPERBNK SETTING 100
A0083		4732	00120 1	SUPER101	OCT	(LAST 4K OF ROPE)
0084			OCT121	OCT	120	BITS FOR SUPERBNK SETTING 101
A0085		4733	00140 1	SUPER110	OCT	SERVICE ROUTINES
A0088					(FIRST 8K OF ACM)	
0067		4734	00144 0	1SEC	DEC	BITS FOR SUPERBNK SETTING 110.
A0068			LOW7	OCT	100	(LAST 8K OF ACM)
0089			BIT8	OCT	177	
A0070			OT215	OCT	00200	INTERPRETER
A0071			8,5	OCT	215	
A0072		4735	00310 0	2SECS	DEC	ALARM AND ABORT
A0073			LOW8	OCT	00220	P20-P25 SUNDANCE
0074			BIT9	OCT	377	PINBALL
A0075		4736	00401 1	GN/CCODE	OCT	SET S/C CONTROL SWITCH TO G/N
A0076			3SECS	DEC	00401	
0077		4737	00454 1	4SECS	DEC	
0079		4740	00820 0	5SECS	DEC	
0080		4741	00777 0	LOW9	OCT	
00801			BIT10	OCT	300	P20-P25 SUNDANCE (OCTAL 00785)
A0081			5.5DEGS	DEC	400	ALARM AND ABORT
A0082			OCT1103	OCT	1103	(OCTAL 01124)
A0083		4742	01124 1	C5/2	DEC	(SAME AS OCTAL 1211)
0084			0509	VN	.0363551	
0085		4743	01211 1	V05N09	VN	
0086		4744	01400 1	OCT1400	OCT	
00865		4745	01428 0	V08N22	VN	
A0087			MID5	OCT	01400	
00875		4748	01778 0	BITS2-10	OCT	
0088		4747	01777 1	LOW10	OCT	

L FIXED-FIXED CONSTANT POOL

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A0089			BIT11	OCT	02000	
A0090			2K+3	OCT	2003	PINBALL
0091	4750	02177 1	LOW7+2K	OCT	2177	OP CODE MASK + BANK 1 FBANK SETTING.
0092	4751	02400 1	EBANK5	OCT	02400	
0093	4752	03000 1	PRI03	OCT	03000	
0094	4753	03400 0	EBANK7	OCT	03400	
A0095			LOW11	OCT	3777	
A0096			BIT12	OCT	04000	PINBALL
A0097			RELTAB	OCT	04025	T4RUPT
0098	4754	05000 1	PRI05	OCT	05000	
0099	4755	06000 1	PRI06	OCT	06000	
0100	4756	07000 0	PRI07	OCT	07000	
A0102			BIT13	OCT	10000	
A0103				OCT	10003	
A0104			13,7,2	OCT	10102	T4RUPT RELTAB +1D
0105	4757	11000 1	PRI011	OCT	11000	P20-P25 SUNDANCE
A0106			PRI012	OCT	12000	
0107	4760	13000 0	PRI013	OCT	13000	
0108	4761	14000 1	PRI014	OCT	14000	RANKCALL
A0109				OCT	14031	
0110	4762	15000 0	PRI015	OCT	15000	T4RUPT RELTAB +2D
0111	4763	16000 0	PRI016	OCT	16000	
A0112			85DEGS	DEC	.45556	
0113	4764	17000 1	PRI017	OCT	17000	P20-P25 SUNDANCE (OCTAL 16450)
0114	4765	17770 1	OCT17770	OCT	17770	
A0115			BIT14	OCT	20000	
A0116				OCT	20033	
0117	4766	21000 1	PRI021	OCT	21000	T4RUPT RELTAB +3D
01175	7657		BLOCK 03			
01176	REF 1		COUNT 03/PCONS			
0118						
0119	7657	22000 1	PRI022	OCT	22000	SERVICE ROUTINES
0120	7660	23000 0	PRI023	OCT	23000	
A0121	7661	24000 1	PRI024	OCT	24000	
A0122			5/6+1	OCT	24001	SINGLE PRECISION SUBROUTINES
0123	7662	25000 0	PRI025	OCT	25000	T4RUPT RELTAB +4D
0124	7663	26000 0	PRI026	OCT	26000	
0125	7664	27000 1	PRI027	OCT	27000	
A0126			CHRPRI0	OCT	30000	
A0127				OCT	30036	PINBALL
0128	7665	31000 0	PRI031	OCT	31000	T4RUPT RELTAB +5D
0129	7666	31103 1	C1/2	DEC	.7853134	(OCTAL 31103)
0130	7667	32000 0	PRI032	OCT	32000	
0131	7670	33000 1	PRI033	OCT	33000	
0132	7671	34000 0	PRI034	OCT	34000	
A0133				OCT	34034	
0134	7672	35000 1	PRI035	OCT	35000	T4RUPT RELTAB +6D
0135	7673	36000 1	PRI036	OCT	36000	

## L FIXED-FIXED CONSTANT POOL

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0136	7674	37000 0	PRI037	OCT	37000	
0137	7675	37401 0	63/64+1	OCT	37401	
A0136			MID7	OCT	37600	PINBALL
0139	7676	37766 1	OCT37766	OCT	37766	
0140	7677	37774 1	OCT37774	OCT	37774	
0141	7700	37776 0	OCT37776	OCT	37776	
A01411			DPOS MAX	OCT	37777	
A0142			BIT15	OCT	40000	
A0143			OCT40001	OCT	40001	INTERPRETER ( CS 1 INSTRUCTION)
0144	7701	40014 0	DLOADCCD	OCT	40014	
0145	7702	40015 1	DLOAD*	OCT	40015	
A0148				OCT	40023	T4RUPT RELTAB +7D
01465	7703	40040 1	BIT15+6	OCT	40040	
01466	7704	40200 1	OCT40200	OCT	40200	
A0147				OCT	44035	T4RUPT RELTAB +8D
A0148				OCT	50037	T4RUPT RELTAB +9D
A0149				OCT	54000	T4RUPT RELTAB +10D
01495	7705	57777 1	-BIT14	OCT	57777	
A0150			RELTAB11	OCT	60000	T4RUPT (OCTAL 65552)
0151	7706	65552 0	C3/2	DEC	-3216147	
0152	7707	70000 0	13,14,15	OCT	70000	
0153	7710	73777 1	-1/8	OCT	73777	
0154	7711	74000 1	HIGH4	OCT	74000	
0155	7712	74056 1	-ENDERAS	DEC	-2001	(OCTAL 74056)
A0156			HIS	OCT	76000	PINBALL
0157	7713	77700 0	HIGH9	OCT	77700	
A0158			-ENDVAC	DEC	-45	INTERPRETER (OCTAL 77722)
A0159			-OCT10	OCT	-10	(OCT 77767)
A0181			NEG4	DEC	-4	(OCTAL 77773)
0162	7714	77774 0	NEG3	DEC	-3	
0163	7715	77775 1	NEG2	OCT	77775	
0164	7716	77776 1	NEGONE	DEC	-1	

## L FIXED-FIXED CONSTANT POOL

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P0165 DEFINED BY EQUALS

R0166 IT WOULD BE TO THE USERS ADVANTAGE TO OCCASIONALLY CHECK ANY OF THESE SYMBOLS IN ORDER TO PREVENT ANY  
R0166 ACCIDENTAL DEFINITION CHANGES.

0169	REF	5	LAST	330	7716	MINUS1	=	NEG1
0170	REF	26	LAST	1134	7716	NEG1	=	NEGONE
0171	REF	75	LAST	1079	4712	ONE	=	BIT1
0172	REF	43	LAST	1059	4711	TWO	=	BIT2
0173	REF	1			6214	THREE	=	OCTAL3
0174	REF	41	LAST	1103	6214	LOW2	=	THREE
0175	REF	32	LAST	1045	4710	FOUR	=	BIT3
0176	REF	2	LAST	1063	6211	SIX	=	REVONT
0177	REF	17	LAST	1154	4716	LOW3	=	SEVEN
0178	REF	39	LAST	1051	4707	EIGHT	=	BIT4
0179	REF	7	LAST	1170	4334	NINE	=	R2D1
0180	REF	3	LAST	361	4377	TEN	=	BINCON
0181	REF	9	LAST	1030	4717	NOUTCON	=	ELEVEN
0182	REF	16	LAST	902	4374	OCT23	=	VD1
0183	REF	2	LAST	370	4376	OCT25	=	MD1
0184	REF	36	LAST	1130	4701	PRI01	=	BIT10
0185	REF	7	LAST	1164	4744	EBANK3	=	OCT1400
0186	REF	32	LAST	1166	4700	PRI02	=	BIT11
0187	REF	1			4732	OCT120	=	SUPER101
0188	REF	33	LAST	1174	4700	OCT140.	=	SUPER110
0189	REF	34	LAST	1174	4700	2K	=	BIT11
0190	REF	30	LAST	1043	4677	EBANK4	=	BIT11
0191	REF	2	LAST	496	4752	PRI04	=	BIT12
0192	REF	42	LAST	1169	4676	EBANK6	=	PRI03
0193	REF	43	LAST	1174	4676	QUARTER	=	BIT13
01935	REF	1			7632	PRI010	=	BIT13
0194	REF	23	LAST	1160	4675	OCT10001	=	CCSL
0195	REF	69	LAST	1161	4675	POS1/2	=	HALF
0196	REF	70	LAST	1174	4675	PRI020	=	BIT14
0197	REF	5	LAST	360	4371	HALF	=	BIT14
0198	REF	13	LAST	1101	4371	PRI030	=	CHRPRIO
01965	REF	3	LAST	1066	6440	BIT13-14	=	PRI030
0199	REF	8	LAST	1071	7671	OCT30002	=	TLOAD +1
0200	REF	47	LAST	1167	4674	B12T14	=	PRI034
0201	REF	48	LAST	1174	4674	NECMAX	=	BIT15
0202	REF	1			6056	VLOADCD	=	BIT15
0203	REF	3	LAST	536	4105	VLOAD*	=	OCT40001
0204	REF	5	LAST	326	4364	OCT80000	=	RELTAB11
						BANKMASK	=	H15

INTERPRETER USES IN PROCESSING STORECODE

## L INTERPRETIVE CONSTANTS

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0001	REP	1	26,2000	SETLOC	INTPRET1
0002			26,3321	BANK	
0003	REP	1		COUNT	23/ICONS
0004			26,3321	10000 0	DP1/4TH 2DEC -.25
0004			26,3322	00000 1	
0005			26,3323	00000 1	UNITZ 2DEC 0
0005			26,3324	00000 1	
0006			26,3325	00000 1	UNITY 2DEC 0
0006			26,3326	00000 1	
0007			26,3327	20000 0	UNITX 2DEC -.5
0007			26,3330	00000 1	
0008			26,3331	00000 1	ZEROVCS 2DEC 0
0008			26,3332	00000 1	
0009			26,3333	00000 1	2DEC 0
0009			26,3334	00000 1	
0010			26,3335	00000 1	2DEC 0
0010			26,3336	00000 1	
0011	REP	7 LAST 672	26,3327	DPHALF	= UNITX
0012			26,3337	37777 1	DPPOSMAX OCT 37777
0013			26,3340	37777 1	OCT 37777

L INTERPRETIVE CONSTANTS

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P0014 INTERPRETIVE CONSTANTS IN THE OTHER HALF-MEMORY

0015	REF 1	04,2000	SETLOC	INTPRET2	
0016		04,3447	BANK		
0017	REF 1		COUNT	14/ICONS	
0018		04,3447	00000 1	ZUNIT	2DEC 0
0018		04,3450	00000 1		
0019		04,3451	00000 1	YUNIT	2DEC 0
0019		04,3452	00000 1		
0020		04,3453	20000 0	XUNIT	2DEC .5
0020		04,3454	00000 1		
0021		04,3455	00000 1	ZEROVEC	2DEC 0
0021		04,3456	00000 1		
0022		04,3457	00000 1		2DEC 0
0022		04,3460	00000 1		
0023		04,3461	00000 1		2DEC 0
0023		04,3462	00000 1		
0024		04,3463	77777 0		OCT 77777
0025		04,3464	77771 0	DEC-6	DEC -6
0026		04,3465	77763 0	DEC-12	DEC -12
0027		04,3466	37777 1	LDPMAX	2OCT 3777737777
0027		04,3467	37777 1		THESE TWO CONSTANTS MUST REMAIN
0028		04,3470	37777 1	LDPMAX1	2OCT 3777737777 ADJACENT AND THE SAME FOR INTEGRATION
0028		04,3471	37777 1		
0029	REF 5	LAST 722	04,3455	ZERODP	= ZEROVEC
0030	REF 3	LAST 32	04,3453	HALFDP	= XUNIT

## L SINGLE PRECISION SUBROUTINES

		4767		BLOCK 02			
0001							
R0002		SINGLE PRECISION SINE AND COSINE					
00025	REP	1				COUNT	02/INTER
0003	REP	24	LAST 1174	4767	6 4675 1	SPCOS	AD HALP
0004	REP	1		4770	55=075 0	SPSIN	TS TEMK
0005	REP	1		4771	1 4773 1		TCP SPT
0006	REP	2	LAST 1177	4772	4 1075 0		CS TEMK
0007				4773	6 0000 1	SPT	DOUBLE
0008	REP	3	LAST 1177	4774	55=075 0		TS TEMK
0009	REP	1		4775	1 5006 0		TCP POLLEY
0010	REP	4	LAST 1177	4776	57=075 1		XCH TEMK
0011	REP	5	LAST 1177	4777	51=075 1		INDEX TEMK
0012	REP	6	LAST 1103	5000	6 4673 1		AD LIMITS
0013				5001	4 0000 0		COM
0014	REP	6	LAST 1177	5002	6 1075 1		AD TEMK
0015	REP	7	LAST 1177	5003	55=075 0		TS TEMK
0016	REP	2	LAST 1177	5004	1 5006 0		TCP POLLEY
0017	REP	1		5005	1 5024 0		TCP ARG90
0018				5006	0 0006 1	POLLEY	EXTEND
0019	REP	8	LAST 1177	5007	7 1075 0		MP TEMK
0020	REP	1		5010	55=076 0		TS SQ
0021				5011	0 0006 1		EXTEND
0022	REP	1		5012	7 4742 0		MP C5/2
0023	REP	1		5013	6 7706 1		AD C3/2
0024				5014	0 0006 1		EXTEND
0025	REP	2	LAST 1177	5015	7 1076 0		MP SQ
0026	REP	1		5016	6 7666 0		AD C1/2
0027				5017	0 0006 1		EXTEND
0028	REP	9	LAST 1177	5020	7 1075 0		MP TEMK
0029				5021	20 001 1		DOUBLE
0030	REP	10	LAST 1177	5022	55=075 0		TS TEMK
0031	REP	277	LAST 1169	5023	0 0002 0		TC Q
0032	REP	324	LAST 1169	5024	50 000 1	ARG90	INDEX A
0033	REP	7	LAST 1177	5025	4 4673 0		CS LIMITS
0034	REP	278	LAST 1177	5026	0 0002 0		TC Q
R0040				RESULT SCALED AT 1			
SPROUT WAS DELETED IN REV 51 OF MASTER. ASS. CONT. HAS CARDS.							

L EXECUTIVE

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0001  
 R0002 5027 BLOCK 02  
 TO ENTER A JOB REQUEST REQUIRING NO VAC AREA.

00025 REP 1 COUNT 02/EXEC

00029  
 0003 REP 1 5027 0 0004 0 NOVAC INHINT  
 00031 REP 3 LAST 411 5030 8 5121 0 AD FAKEPRET  
 5031 54 063 0 TS NEWPrio LOC(MPAC +6) - LOC(QPRET)  
 PRIORITY OF NEW JOB + NOVAC C(FIXLOC)

0004  
 0005 REP 279 LAST 1177 5032 0 0006 1 EXTEND  
 0006 5033 5 0002 0 INDEX 0 O WILL BE UNDISTURBED THROUGHOUT.  
 0007 REP 1 5034 3 0001 0 DCA 0 2ADR OF JOB ENTERED.  
 0008 REP 1 5035 52 068 0 DXCH NEWLOC  
 0009 REP 24 LAST 1120 5036 3 5120 1 CAP EXECRANK  
 0010 REP 1 5037 56 004 0 XCH FBANK  
 0011 REP 1 5040 54 081 1 TS EXECITEM1  
 5041 1 2650 1 TCF NOVAC2 ENTER EXECUTIVE BANK.

R0012 TO ENTER A JOB REQUEST REQUIRING A VAC AREA - E.G., ALL (PARTIALLY) INTERPRETIVE JOBS.

0014  
 0015 REP 4 LAST 1178 5042 0 0004 0 FINDVAC INHINT  
 0016 5043 54 063 0 TS NEWPrio  
 0017 REP 280 LAST 1178 5044 0 0006 1 EXTEND  
 0018 5045 5 0002 0 INDEX 0  
 0019 REP 2 LAST 1178 5046 3 0001 0 DCA 0  
 0020 REP 25 LAST 1178 5047 52 068 0 SPVACIN DXCH NEWLOC  
 0021 REP 1 5050 3 5120 1 CAP EXECRANK  
 5051 56 004 0 XCH FBANK  
 5052 1 2828 0 TCF FINDVAC2 OFF TO EXECUTIVE SWITCHED-BANK.

R00211 TO ENTER A FINDVAC WITH THE PRIORITY IN NEWPrio TO THE 2ADR ARRIVING IN A AND L.

R00212 USERS OF SPVAC MUST INHINT BEFORE STORING IN NEWPrio.

00213 REP 281 LAST 1178 5053 58 002 0 SPVAC XCH 0  
 00214 REP 5 LAST 1020 5054 8 7715 0 AD NEG2  
 00215 REP 282 LAST 1178 5055 58 002 0 XCH 0  
 00216 REP 1 5056 1 5047 0 TCF SPVACIN

R0022 TO SUSPEND A BASIC JOB SO A HIGHER PRIORITY JOB MAY BE SERVICED.

0024 REP 283 LAST 1178 5057 22 002 0 CHANG1 LXCH 0  
 0025 REP 3 LAST 1178 5060 3 5120 1 CAP EXECRANK  
 0026 REP 20 LAST 1100 5061 56 006 1 XCH FBANK  
 0027 REP 1 5062 1 2727 0 TCF CHANJOB

R0030 TO SUSPEND AN INTERPRETIVE JOB.

0031 REP 28 LAST 1169 5063 4 0164 0 CHANG2 CS LOC  
 R00315 ITRACE (4) REFERS TO ACHANG28.

NEGATIVE LOC SHOWS JOB = INTERPRETIVE.

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0032	REP 196	LAST 1157	5064	54 001 1	TS	L
0033	REP 4	LAST 1178	5065	3 5120 1	+2	CAP EXECBANK
00335	REP 21	LAST 1178	5066	54 006 0	TS	BBANK
0034	REP 2	LAST 1176	5067	1 2726 1	TOP	CHANJOB -1

L EXECUTIVE

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P0035 TO VOLUNTARILY SUSPEND A JOB UNTIL THE COMPLETION OF SOME ANTICIPATED EVENT (I/O EVENT ETC.)

0037	REF	29	LAST 1178	5070	54 164 0	JOBSLP1	TS	LOC
0038	REF	5	LAST 1179	5071	3 5120 1	CAF	EXCBANK	
0039	REF	26	LAST 1178	5072	54 004 1	TS	FBANK	
0040	REF	1		5073	1 3017 0	TCP	JOBSLP1	

R0041 TO AWAKEN A JOB PUT TO SLEEP IN THE ABOVE FASHION

0042				5074	0 0004 0	JOBWAKE	INHINT
00421	REF	3	LAST 1178	5075	54 085 0	TS	NEWLOC
0043	REF	59	LAST 1117	5078	4 4711 0	CS	TWO
0044	REF	284	LAST 1178	5077	26 002 1	ADS	Q
0045	REF	6	LAST 1180	5100	3 5120 1	CAF	EXCBANK
0046	REF	27	LAST 1180	5101	58 004 0	XCH	FBANK
0047	REF	1		5102	1 3044 0	TCP	JOBWAKE2

EXIT IS VIA FINDVAC/NOVAC PROCEDURES.

R0048 TO CHANGE THE PRIORITY OF A JOB CURRENTLY UNDER EXECUTION

0049				5103	0 0004 0	PRIOCHNG	INHINT
0050	REF	5	LAST 1178	5104	54 083 0	TS	NEWPRIO
0051	REF	7	LAST 1180	5105	3 5120 1	CAF	EXCBANK
0052	REF	22	LAST 1179	5108	58 008 1	XCH	BBANK
0053	REF	9	LAST 1100	5107	54 185 1	TS	BANKSET
0054	REF	285	LAST 1180	5110	3 0002 0	CA	Q
0055	REF	1		5111	1 3113 0	TCP	PRIOCH2

NEW PRIORITY ARRIVES IN A. RETURNS TO CALLER AS SOON AS NEW JOB PRIORITY IS HIGHEST. PREPARE FOR POSSIBLE BASIC-STYLE CHANGE-JOB.

R0058 TO REMOVE A JOB FROM EXECUTIVE CONSIDERATIONS

0059	REF	8	LAST 1180	5112	3 5120 1	ENDOFJOB	CAF	EXCBANK
0060	REF	28	LAST 1180	5113	54 004 1	TS	FBANK	
0061	REF	1		5114	1 3124 1	TCP	ENDJOB1	
0062	REF	2	LAST 1178	5115	3 0081 0	ENDPIND	CA	EXPECTM1
0063	REF	29	LAST 1180	5116	54 004 1	TS	FBANK	
0064	REF	1		5117	1 6710 0	TCP	Q+2	
0066	REF	2	LAST 1178	5120	02628 1	EXCBANK	CADR	FINDVAC2
00665	REF	635	LAST 1165	5121	00110 1	FAKEPRET	ADRES	MPAC -36D

RETURN TO CALLER AFTER JOB ENTRY COMPLETE.

LOC(MPAC +6) - LOC(OPRET)

L EXECUTIVE

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P0067 LOCATE AN AVAILABLE VAC AREA.

						BANK	01
						COUNT	01/EXEC
0068			01,2626				
00685	REP	1					
0069	REP	3	LAST 1180	01,2626	54 061 1	FINDVAC2	TS EXECITEM1
0070	REP	4	LAST 217	01,2627	10 400 1	CCS	VAC1USE
0071	REP	1		01,2630	1 2843 0	TOP	VACPOUND
0072	REP	3	LAST 217	01,2631	10 454 0	CCS	VAC1USE
0073	REP	2	LAST 1181	01,2632	1 2843 0	TOP	VACPOUND
0074	REP	3	LAST 217	01,2633	10 530 0	CCS	VAC1USE
0075	REP	3	LAST 1181	01,2634	1 2843 0	TOP	VACPOUND
0076	REP	3	LAST 217	01,2635	10 604 1	CCS	VAC1USE
0077	REP	4	LAST 1181	01,2636	1 2843 0	TOP	VACPOUND
0078	REP	3	LAST 217	01,2637	10 660 0	CCS	VAC1USE
0079	REP	5	LAST 1181	01,2640	1 2843 0	TOP	VACPOUND
0080	REP	4	LAST 561	01,2641	0 5804 0	TC	BAILOUT
0081				01,2642	01201 0	OCT	1201
0082	REP	60	LAST 1180	01,2643	6 4711 1	VACPOUND	AD TWO
0083				01,2644	22 007 0	ZL	
0084	REP	325	LAST 1177	01,2645	50 000 1	INDEX	A
0085				01,2646	21<777 0	LXCH	0 -1
0086	REP	6	LAST 1160	01,2647	28 063 0	ADS	NEWPRIO
0087	REP	240	LAST 1161	01,2650	3 4714 1	NOVAC2	CAP ZERO
0088	REP	5	LAST 415	01,2651	54 064 1	TS	LOCCTR
0089	REP	1		01,2652	3 2657 1	CAP	NO_CORES
0090	REP	1		01,2653	54 062 1	NOVAC3	TS EXECITEM2
0091	REP	6	LAST 1181	01,2654	50 064 0	INDEX	LOCCTR
0092	REP	8	LAST 187	01,2655	10 167 0	CCS	PRIORITY
0093	REP	1		01,2656	1 2717 0	TOP	NEXTCORE
0094				01,2657	00006 1	NO_CORES	DEC 6
0095	REP	2	LAST 1161	01,2660	1 2717 0	TCP	NEXTCORE

(SAVE CALLER-S BANK FIRST.)

NO VAC AREAS.

RESERVE THIS VAC AREA BY STORING A ZERO  
IN ITS VAC USE REGISTER AND STORE THE  
ADDRESS OF THE FIRST WORD OF IT IN THE  
LOW NINE BITS OF THE PRIORITY WORD.

NOVAC ENTERS HERE. FIND A CORE SET.

SEVEN SETS OF ELEVEN REGISTERS EACH.

EACH PRIORITY REGISTER CONTAINS -0 IF  
THE CORRESPONDING CORE SET IS AVAILABLE.AN ACTIVE JOB HAS A POSITIVE PRIORITY  
BUT A DORMANT JOB-S PRIORITY IS NEGATIVE

A0096

L EXECUTIVE

0097	REP	7	LAST 1181	01,2661	3 0063 1	CORPOUND	CA	NEWPRIO
0098	REP	7	LAST 1181	01,2662	50 064 0	INDEX	LOCCTR	
0099	REP	9	LAST 1181	01,2663	54 167 0	TS	PRIORITY	
0100	REP	4	LAST 228	01,2664	7 4741 0	MASK	LONG	
0101	REP	6	LAST 1182	01,2665	50 064 0	INDEX	LOCCTR	
0102	REP	19	LAST 1152	01,2666	54 166 1	TS	PUSHLOC	
0103	REP	9	LAST 1162	01,2667	10 064 1	CCS	LOCCTR	
0104	REP	1		01,2670	1 2704 1	TCP	SETLOC	
0105	REP	11	LAST 1165	01,2671	54 121 1	TS	OFIND	
0106	REP	20	LAST 1182	01,2672	3 0166 0	CA	PUSHLOC	
0107	REP	34	LAST 1166	01,2673	54 120 0	TS	FIXLOC	
0108	REP	6	LAST 1078	01,2674	10 067 1	SPECTEST	CCS	
0109	REP	2	LAST 1182	01,2675	1 2704 1	TCP	NEWJOB	
0110	REP	10	LAST 1169	01,2676	0 5640 0	TC	SETLOC	
0111	REP	11	LAST 1182	01,2677	0 5640 0	TC	CCSHOLE	
0112	REP	7	LAST 1182	01,2700	54 067 1	TS	CCSHOLE	
0113	REP	4	LAST 1180	01,2701	52 066 0	TS	NEWJOB	
0114	REP	30	LAST 1180	01,2702	52 165 1	DXCH	NEWLOC	
0115	REP	1		01,2703	1 5115 0	DXCH	LOC	
0116	REP	5	LAST 1182	01,2704	52 066 0	TCP	ENDPIND	
0117	REP	10	LAST 1182	01,2705	50 064 0	SETLOC	DXCH	
0118	REP	31	LAST 1182	01,2706	52 165 1	INDEX	NEWLOC	
0119	REP	8	LAST 1182	01,2707	50 067 0	DXCH	LOC	
0120	REP	10	LAST 1182	01,2710	4 0167 0	INDEX	NEWJOB	
0121	REP	8	LAST 1182	01,2711	6 0063 1	CS	PRIORITY	
0122	REP			01,2712	0 0006 1	AD	NEWPRIO	
0123	REP	2	LAST 1182	01,2713	6 5115 1	EXTEND		
0124	REP	11	LAST 1182	01,2714	3 0064 0	BZNP	ENDPIND	
0125	REP	9	LAST 1182	01,2715	54 067 1	CA	LOCCTR	
0126	REP	3	LAST 1182	01,2716	1 5115 0	TS	NEWJOB	
0127	REP	1		01,2717	3 3054 0	TCP	ENDPIND	
0128	REP	12	LAST 1182	01,2720	26 064 1	NEXTCORE	CAP	
0129	REP	2	LAST 1181	01,2721	10 062 1	ADS	LOCCTR	
0130	REP	1		01,2722	1 2653 1	CCS	EXECITEM2	
0131	REP	5	LAST 1181	01,2723	0 5604 0	TCP	NOVAC3	
0132	REP			01,2724	01202 0	TC	BAILOUT	
						OCT	1202	

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SET THE PRIORITY OF THIS JOB IN THE CORE  
 SET=S PRIORITY REGISTER AND SET THE  
 JOB=S PUSH-DOWN POINTER AT THE BEGINNING  
 OF THE WORK AREA AND OVERFLOW INDICATOR

OFF TO PREPARE FOR INTERPRETIVE PROGRAMS

IF CORE SET ZERO IS BEING LOADED, SET UP  
 OFIND AND FIXLOC IMMEDIATELY

SEE IF ANY ACTIVE JOBS WAITING (RARE).  
 MUST BE AWAKENED BUT UNCHANGED JOB.

\*0 SHOWS ACTIVE JOB ALREADY SET.

SET UP THE LOCATION REGISTERS FOR THIS

THIS INDEX INSTRUCTION INSURES THAT THE  
 HIGHEST ACTIVE PRIORITY WILL BE COMPARED  
 WITH THE NEW PRIORITY TO SEE IF NEWJOB  
 SHOULD BE SET TO SIGNAL A SWITCH.

LOCCTR IS LEFT SET AT THIS CORE SET IF  
 THE CALLER WANTS TO LOAD ANY MPAC  
 REGISTERS, ETC.

NO CORE SETS.

L EXECUTIVE

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P0133 THE FOLLOWING ROUTINE SWAPS CORE SET 0 WITH THAT WHOSE RELATIVE ADDRESS IS IN NEWJOB.

01345	REP	32	LAST	1182	01,2725	22 164 1	-2	LXCH	LOC	
0135	REP	10	LAST	1180	01,2726	30 185 0	-1	CAB	BANKSET	BANKSET, NOT BBANK, HAS RIGHT CONTENTS.
0136					01,2727	0 0004 0		CHANJOB	INHINT	
01362					01,2730	0 0008 1			EXTEND	
01364	REP	14	LAST	1078	01,2731	04 007 1		ROR	SUPERBANK	
01366	REP	197	LAST	1179	01,2732	58 001 0		XCH	L	PICK UP CURRENT SBANK FOR BBCON
01368	REP	10	LAST	1182	01,2733	50 087 0	+4	INDEX	NEWJOB	LOC IN A AND BBCON IN L.
0137	REP	33	LAST	1183	01,2734	52 185 1		DXCH	LOC	SWAP LOC AND BANKSET.
0138	REP	34	LAST	1183	01,2735	52 165 1		DXCH	LOC	
01382	REP	11	LAST	1183	01,2736	30 185 0		CAB	BANKSET	
01384					01,2737	0 0008 1		EXTEND		
01388	REP	15	LAST	1183	01,2740	01 007 1		WRITE	SUPERBANK	SET SBANK FOR NEW JOB.
0139	REP	638	LAST	1180	01,2741	52 155 1		DXCH	MPAC	SWAP MULTI-PURPOSE ACCUMULATOR AREAS.
0140	REP	11	LAST	1183	01,2742	50 087 0		INDEX	NEWJOB	
0141	REP	637	LAST	1183	01,2743	52 155 1		DXCH	MPAC	
0142	REP	638	LAST	1183	01,2744	52 155 1		DXCH	MPAC	
0143	REP	639	LAST	1183	01,2745	52 157 0		DXCH	MPAC +2	
0144	REP	12	LAST	1183	01,2748	50 087 0		INDEX	NEWJOB	
0145	REP	840	LAST	1183	01,2747	52 157 0		DXCH	MPAC +2	
0146	REP	641	LAST	1183	01,2750	52 157 0		DXCH	MPAC +2	
0147	REP	642	LAST	1183	01,2751	52 161 0		DXCH	MPAC +4	
0148	REP	13	LAST	1183	01,2752	50 087 0		INDEX	NEWJOB	
0149	REP	843	LAST	1183	01,2753	52 181 0		DXCH	MPAC +4	
0150	REP	644	LAST	1183	01,2754	52 181 0		DXCH	MPAC +4	
0151	REP	645	LAST	1183	01,2755	52 183 1		DXCH	MPAC +6	
0152	REP	14	LAST	1183	01,2758	50 087 0		INDEX	NEWJOB	
0153	REP	848	LAST	1183	01,2757	52 183 1		DXCH	MPAC +8	
0154	REP	647	LAST	1183	01,2780	52 163 1		DXCH	MPAC +6	
0155	REP	241	LAST	1161	01,2781	3 4714 1		CAP	ZERO	
0156	REP	12	LAST	1162	01,2782	58 121 0		XCH	OVFIND	MAKE PUSHLOC NEGATIVE IF OVFIND NZ.
0157					01,2783	0 0006 1		EXTEND		
0158					01,2784	1 2787 1		B2P	+3	
0159	REP	21	LAST	1162	01,2785	4 0188 1		CS	PUSHLOC	
0160	REP	22	LAST	1183	01,2766	54 166 1		TS	PUSHLOC	
0161	REP	23	LAST	1163	01,2767	52 167 0		DXCH	PUSHLOC	
0162	REP	15	LAST	1183	01,2770	50 087 0		INDEX	NEWJOB	
0163	REP	24	LAST	1183	01,2771	52 187 0		DXCH	PUSHLOC	
0164	REP	25	LAST	1163	01,2772	52 167 0		DXCH	PUSHLOC	
0165	REP	5	LAST	1182	01,2773	3 4741 1		CAP	LOW9	SWAPS PUSHLOC AND PRIORITY.
0166	REP	11	LAST	1182	01,2774	7 0167 0		MASK	PRIORITY	SET FIXLOC TO BASE OF VAC AREA.
0167	REP	35	LAST	1182	01,2775	54 120 0		TS	FIXLOC	
0168	REP	26	LAST	1183	01,2778	10 168 1		CCS	PUSHLOC	
0169	REP	242	LAST	1183	01,2777	3 4714 1		CAP	ZERO	SET OVERFLOW INDICATOR ACCORDING TO
0170	REP	1			01,3000	1 3005 0		TCF	ENDPRCHG -1	

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0171	REP	27	LAST	1183	01,3001	4 0166	1	CS	PUSHLOC
0172	REP	28	LAST	1184	01,3002	54 168	1	TS	PUSHLOC
0173	REP	141	LAST	1147	01,3003	3 4712	1	CAF	ONE
0174	REP	13	LAST	1183	01,3004	58 121	0	XCH	O/PIND
0175	REP	16	LAST	1183	01,3005	54 067	1	TS	NEWJOB
0176					01,3008	0 0003	1	ENDPRCHG	RELINT
0177	REP	35	LAST	1183	01,3007	52 165	1	DXCH	LOC
0178					01,3010	0 0008	1	EXTEND	
0179					01,3011	6 3013	0	BZMP	+2
0180					01,3012	52 006	0	DTCB	

BASIC JOBS HAVE POSITIVE ADDRESSES, SO  
DISPATCH WITH A DTCH.  
IF INTERPRETIVE, SET UP EBANK, ETC.

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0181			01,3013	4 0000 0	COM	
0182	REP 142	LAST 1184	01,3014	6 4712 1	AD	ONE
0183	REP 36	LAST 1184	01,3015	54 184 0	TS	LOC
0186	REP 1		01,3016	1 6017 0	TCP	INTRSM

EPILOGUE TO JOB CHANGE FOR INTERPRETIVE  
RESUME.

R0187 COMPLETE JOBSLEEP PREPARATIONS.

0188			01,3017	0 0004 0	JOB SLP1	INHINT
0189	REP 12	LAST 1183	01,3020	4 0167 0	CS	PRIORITY
0190	REP 13	LAST 1185	01,3021	54 167 0	TS	PRIORITY
0191	REP 8	LAST 1119	01,3022	3 6043 0	CAP	LOW
0192	REP 23	LAST 1180	01,3023	7 0008 0	MASK	BBANK
01921			01,3024	0 0008 1	EXTEND	
01922	REP 16	LAST 1183	01,3025	04 007 1	ROR	SUPERBNK
0193	REP 12	LAST 1183	01,3026	54 165 1	TS	BANKSET
0194	REP 243	LAST 1183	01,3027	4 4714 0	CS	ZERO
0195	REP 111	LAST 1155	01,3030	54 131 0	JOB SLP2	TS
0198	REP 1		01,3031	1 3141 1	TCP	BUF +1 EJSCAN
01961			01,3032	0 0004 0	NUCHANG2	INHINT
019811	REP 17	LAST 1184	01,3033	10 087 1	CCS	NEWJOB
019812			01,3034	1 3037 1	TCP	+3
019813			01,3035	0 0003 1	RELINT	
019814	REP 1		01,3036	1 3233 1	TCP	ADVAN +2
01982	REP 61	LAST 1181	01,3037	3 4711 1	CAF	TWO
01983			01,3040	0 0006 1	EXTEND	
01984	REP 30	LAST 908	01,3041	05 011 1	WOR	DSALMOUT
01985	REP 37	LAST 1185	01,3042	52 185 1	DXCH	LOC
01986	REP 3	LAST 1179	01,3043	1 2733 0	TCP	CHANJOB + 4

NNZ PRIORITY SHOWS JOB ASLEEP.

SAVE OLD SUPERBANK VALUE.

HOLDS - HIGHEST PRIORITY.  
SCAN FOR HIGHEST PRIORITY ALA ENDOFJOB.

QUICK... DONT LET NEWJOB CHANGE TO +0 .

NEWJOB STILL PNZ  
NEWJOB HAS CHANGED TO +0. WAKE UP JOB  
VIA NUDIRECT. (VERY RARE CASE.)

TURN ON ACTIVITY LIGHT  
AND SAVE ADDRESS INFO FOR BENEFIT OF  
POSSIBLE SLEEPING JOB.

L EXECUTIVE

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P0197 TO WAKE UP A JOB, EACH CORE SET IS FOUND TO LOCATE ALL JOBS WHICH ARE ASLEEP. IF THE PCADR IN THE LOCCTR IS SET TO -1 AND NO FURTHER ACTION TAKES PLACE.

0202	REP	4	LAST	1161	01,3044	54 061 1	JOBWAKE2	TS	EXECITEM1	BEGIN CORE SET SCAN.	
0203	REP	244	LAST	1165	01,3045	3 4714 1		CAP	ZERO		
0204	REP	13	LAST	1162	01,3046	54 064 1		TS	LOCCTR		
0205	REP	2	LAST	1161	01,3047	3 2657 1		CAP	NO CORES		
0206	REP	3	LAST	1162	01,3050	54 062 1	JOBWAKE4	TS	EXECITEM2		
0207	REP	14	LAST	1166	01,3051	50 064 0		INDEX	LOCCTR		
0208	REP	14	LAST	1165	01,3052	10 187 0		CCS	PRIORITY		
0209	REP	1			01,3053	1 3056 0		TCP	JOBWAKE3		
0210					01,3054	00014 1	COREINC	DEC	12		
0211	REP	1			01,3055	1 3065 0		TCP	WAKETEST		
0212	REP	2	LAST	1162	01,3056	3 3054 0	JOBWAKE3	CAP	COREINC	ACTIVE JOB - CHECK NEXT CORE SET. 12 REGISTERS PER CORE SET. SLEEPING JOB - SEE IF CADR MATCHES.	
0213	REP	15	LAST	1166	01,3057	26 064 1		ADS	LOCCTR		
0214	REP	4	LAST	1166	01,3060	10 062 1		CCS	EXECITEM2		
0215	REP	1			01,3081	1 3050 0		TCP	JOBWAKE4		
0216	REP	143	LAST	1185	01,3082	4 4712 0		CS	ONE		
0217	REP	16	LAST	1166	01,3083	54 064 1		TS	LOCCTR		
0218	REP	4	LAST	1162	01,3084	1 5115 0		TCP	ENDFIND		
0219	REP	6	LAST	1182	01,3085	4 0065 0	WAKETEST	CS	NEWLOC		
0220	REP	17	LAST	1186	01,3086	50 064 0		INDEX	LOCCTR		
0221	REP	38	LAST	1185	01,3087	6 0164 1		AD	LOC		
0222					01,3070	0 0008 1		EXTEND			
0223					01,3071	1 3073 1		BZF	+2		
0224	REP	2	LAST	1166	01,3072	1 3056 0		TCP	JOBWAKE3		
0225	REP	18	LAST	1166	01,3073	50 064 0		INDEX	LOCCTR	IF MATCH. EXAMINE NEXT CORE SET IF NO MATCH.	
0226	REP	15	LAST	1166	01,3074	4 0167 0		CS	PRIORITY		
0227	REP	9	LAST	1162	01,3075	54 063 0		TS	NEWPPIO		
0228	REP	19	LAST	1166	01,3076	50 064 0		INDEX	LOCCTR		
0229	REP	16	LAST	1166	01,3077	54 167 0		TS	PRIORITY		
0230	REP	1			01,3100	4 4364 0		CS	FBANKMSK		
0231	REP	7	LAST	1166	01,3101	7 0065 0		MASK	NEWLOC		
0232	REP	3	LAST	1096	01,3102	6 4700 1		AD	2K		
0233	REP	6	LAST	1166	01,3103	56 065 1		XCH	NEWLOC		
0234	REP	2	LAST	1166	01,3104	7 4364 0		MASK	FBANKMSK		
0235	REP	20	LAST	1166	01,3105	50 064 0		INDEX	LOCCTR		
0236	REP	13	LAST	1165	01,3106	6 0165 0		AD	BANKSET		
0237	REP	9	LAST	1166	01,3107	54 066 0		TS	NEWLOC +1		
0238	REP	21	LAST	1166	01,3110	10 064 1		CCS	LOCCTR	MAKE UP THE 2CADR OF THE WAKE ADDRESS USING THE CADR IN NEWLOC AND THE ERANK HALF OF BBANK SAVED IN BANKSET.	
0239	REP	3	LAST	1162	01,3111	1 2704 1		TCP	SETLOC		
0240	REP	1			01,3112	1 2674 1		TCP	SPECTEST		
										SPECIAL TREATMENT IF THIS JOB WAS ALREADY IN THE RUN (0) POSITION.	

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P0241 PRIORITY CHANGE. CHANGE THE CONTENTS OF PRIORITY AND SCAN FOR THE JOB OF HIGHEST PRIORITY.

0243	REF	39	LAST	1186	01,3113	54 164 0	PRIORH2	TS	LOC	
0244	REF	245	LAST	1186	01,3114	3 4714 1		CAP	ZERO	SET FLAG TO TELL ENDJOB SCANNER IF THIS
0245	REF	112	LAST	1185	01,3115	54 130 1		TS	BUF	JOB IS STILL HIGHEST PRIORITY.
0246	REF	6	LAST	1183	01,3116	3 4741 1		CAP	LOW9	
0247	REF	17	LAST	1186	01,3117	7 0167 0		MASK	PRIORITY	
0248	REF	10	LAST	1186	01,3120	6 0063 1		AD	NEWPrio	
0249	REF	18	LAST	1187	01,3121	54 167 0		TS	PRIORITY	
0250					01,3122	4 0000 0		COM		
0251	REF	1			01,3123	1 3030 0		TCP	JOBSLP2	AND TO EJSCAN.

L EXECUTIVE

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P0252 RELEASE THIS CORE SET AND VAC AREA AND SCAN FOR THE JOB OF HIGHEST ACTIVE PRIORITY.

0254		01,3124	0 0004 0	ENDJOB1	INHINT		
0255	REP 246	LAST 1187	01,3125	4 4714 0	CS	ZERO	
0256	REP 113	LAST 1187	01,3126	54 131 0	TS	BUF +1	
0257	REP 19	LAST 1187	01,3127	58 167 1	XCH	PRIORITY	
0258	REP 7	LAST 1187	01,3130	7 4741 0	MASK	LOW9	
02581	REP 198	LAST 1183	01,3131	54 001 1	TS	L	
02582	REP 2	LAST 1178	01,3132	4 5121 1	CS	FAKEPRT	
025821	REP 199	LAST 1188	01,3133	6 0001 0	AD	L	
02583			01,3134	0 0008 1	EXTEND		
02584	REP 2	LAST 1185	01,3135	8 3141 0	EZMP	EJSCAN	NOVAC ENDJOB
0259	REP 200	LAST 1186	01,3136	10 001 1	CCS	L	
0260	REP 328	LAST 1181	01,3137	50 000 1	INDEX	A	
0261			01,3140	54 000 0	TS	0	
0262	REP 20	LAST 1168	01,3141	10 203 1	EJSCAN	CCS	PRIORITY +12D
0263	REP 1		01,3142	0 3208 0	TC	EJ1	
0264	REP 12	LAST 1162	01,3143	0 5840 0	TC	CCSHOLE	
0265			01,3144	1 3145 0	TCP	+1	
0266	REP 21	LAST 1188	01,3145	10 217 1	CCS	PRIORITY +24D	
0267	REP 2	LAST 1188	01,3146	0 3206 0	TC	EJ1	
0268	REP 13	LAST 1188	01,3147	0 5840 0	TC	CCSHOLE	
0269			01,3150	1 3151 0	TCP	+1	
0270	REP 22	LAST 1188	01,3151	10 233 1	CCS	PRIORITY +36D	
0271	REP 3	LAST 1188	01,3152	0 3208 0	TC	EJ1	
0272	REP 23	LAST 1188	01,3153	87810 1	-CCSPR	CCS	PRIORITY
0273			01,3154	1 3155 1	TC	+1	
0274	REP 24	LAST 1188	01,3155	10 247 1	CCS	PRIORITY +48D	
0275	REP 4	LAST 1188	01,3158	0 3208 0	TC	EJ1	
0276	REP 14	LAST 1188	01,3157	0 5640 0	TC	CCSHOLE	
0277			01,3160	1 3181 0	TCP	+1	
0278	REP 25	LAST 1188	01,3161	10 263 1	CCS	PRIORITY +60D	
0279	REP 5	LAST 1188	01,3162	0 3206 0	TC	EJ1	
0280	REP 15	LAST 1188	01,3183	0 5840 0	TC	CCSHOLE	
0281			01,3164	1 3165 1	TCP	+1	
0282	REP 26	LAST 1188	01,3165	10 277 1	CCS	PRIORITY +72D	
0283	REP 6	LAST 1188	01,3166	0 3208 0	TC	EJ1	
0284	REP 18	LAST 1188	01,3167	0 5640 0	TC	CCSHOLE	
0285			01,3170	1 3171 1	TCP	+1	

L EXECUTIVE

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P0286 EVALUATE THE RESULTS OF THE SCAN.

0287	REF 114	LAST 1188	01,3171	10 131 0	CCS	BUF +1	SEE IF THERE ARE ANY ACTIVE JOBS WAITING	
0288	REF 17	LAST 1188	01,3172	0 5840 0	TC	CCSHOLE		
0289	REF 18	LAST 1189	01,3173	0 5840 0	TC	CCSHOLE		
0290			01,3174	1 3176 0	TCP	+2		
0291	REF 2	LAST 181	01,3175	1 3223 0	TCP	DUMMYJOB		
0292	REF 115	LAST 1189	01,3176	10 130 1	CCS	BUF		
0293			01,3177	1 3201 0	TCP	+2		
0294	REF 2	LAST 1183	01,3200	1 3005 0	TCP	ENDPRCHG -1		
0295	REF 327	LAST 1188	01,3201	50 000 1	INDEX	A		
0296			01,3202	2<7777 0	CAP	0 -1	OTHERWISE, SET NEWJOB TO THE RELATIVE	
0297	REF 1		01,3203	6 3153 0	AD	-CCSPR	ADDRESS OF THE NEW JOB-S CORE SET.	
0298	REF 18	LAST 1185	01,3204	54 087 1	TS	NEWJOB		
0299	REF 4	LAST 1185	01,3205	1 2725 1	TCP	CHANJOB -2		
0300	REF 116	LAST 1189	01,3206	54 132 0	EJ1	TS	BUF +2	
0301	REF 117	LAST 1189	01,3207	6 0131 1	AD	BUF +1	- OLD HIGH PRIORITY.	
0302	REF 328	LAST 1189	01,3210	10 000 0	CCS	A		
0303	REF 118	LAST 1189	01,3211	4 0132 0	CS	BUF +2		
0304	REF 1		01,3212	1 3218 0	TCP	EJ2	NEW HIGH PRIORITY.	
0305			01,3213	13 214 1	NCOP			
0306	REF 288	LAST 1180	01,3214	50 002 0	INDEX	0		
0307			01,3215	0 0002 0	TC	2	PROCEED WITH SEARCH.	
0308	REF 119	LAST 1189	01,3216	54 131 0	EJ2	TS	BUF +1	
0309			01,3217	0 0008 1	EXTEND			
0310	REF 120	LAST 1189	01,3220	22 130 0	QXCH	BUF	FOR LOCATING CCS PRIORITY + X INSTR.	
0311	REF 121	LAST 1189	01,3221	50 130 0	INDEX	BUF		
0312			01,3222	0 0002 0	TC	2		

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L EXECUTIVE

P0314 IDLING AND COMPUTER ACTIVITY (GREEN) LIGHT MAINTENANCE. THE IDLING ROUTINE IS NOT A JOB IN ITSELF,  
R0316 BUT RATHER A SUBROUTINE OF THE EXECUTIVE.

0318	REF 4 LAST 257	1361	EBANK= SELPRET	SELFCHECK STORAGE IN EBANK.
0319	REF 247 LAST 1188	01,3223 4 4714 0	DUMMYJOB CS	ZERO
0320	REF 19 LAST 1189	01,3224 54 087 1	TS	NEWJOB
0321		01,3225 0 0003 1	RELINT	
0322	REF 62 LAST 1185	01,3226 4 4711 0	CS	TWO
0323		01,3227 0 0008 1	EXTEND	
0324	REF 31 LAST 1185	01,3230 03 011 1	WAND	DSALMOUT
0328	REF 20 LAST 1190	01,3231 10 067 1	ADVAN	CCS NEWJOB
0329	REF 1	01,3232 1 3032 1	TCP	NUCHANG2
0330	REF 63 LAST 1190	01,3233 3 4711 1	CAP	TWO
0331	REF 1	01,3234 1 3242 1	TCP	NUDIRECT
03317	REF 5 LAST 1190	01,3235 3 1361 1	CA	SELPRET
03318	REF 201 LAST 1188	01,3236 54 001 1	TS	L
0332	REF 1	01,3237 3 3241 0	CAP	SELPBANK
0333	REF 4 LAST 622	01,3240 1 5123 0	TCP	SUPDXCHZ + 1
03338	REF 6 LAST 1190	1361	EBANK= SELPRET	
0334	REF 3 LAST 257	01,3241 68102 1	SELPBANK BBCON	SELPCH
0335		01,3242 0 0008 1	NUDIRECT	EXTEND
0336	REF 32 LAST 1190	01,3243 05 011 1	WOR	DSALMOUT
0337	REF 40 LAST 1187	01,3244 52 165 1	DXCH	LOC
03372	REF 5 LAST 1190	01,3245 1 5122 1	TCP	SUPDXCHZ
03378		5122	BLOCK 2	
03379	REF 2 LAST 1178 TO 1181*	59 59*	COUNT 02/EXEC	IN FIXED-FIXED SO OTHERS MAY USE.
R033791 SUPDXCHZ - ROUTINE TO TRANSFER TO SUPERBANK.				
R033792 CALLING SEQUENCE				
A033793				
0338	REF 202 LAST 1190	5122 56 001 0	SUPDXCHZ XCH	TCP SUPDXCHZ WITH 2CADR OF DESIRED LOCATION IN A + L.
03381		5123 0 0006 1	+1	EXTEND BASIC.
03382	REF 17 LAST 1185	5124 01 007 1	WRITE	SUPERBANK
03383	REF 24 LAST 1185	5125 54 006 0	TS	BANK
03384	REF 203 LAST 1190	5126 0 0001 0	TC	L
0339		5127 77677 1	NBO100 OCT	77677

L WAITLIST

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R0001 PROGRAM DESCRIPTION  
 R0003 MOD NO - 2  
 R0005 MOD BY - MILLER (DTMAX INCREASED TO 162.5 SEC)  
 R00072 MOD 3 BY KERNAN (INHINT INSERTED AT WAITLIST) 2/28/88 SKIPPER REV 4

DATE - 10 OCTOBER 1988  
 LOG SECTION - WAITLIST  
 ASSEMBLY SUNBURST REV 5

R00073 MOD 4 BY KERNAN (TWIDDLE IN 54) 3/28/88 SKIPPER REV 13.  
 R000799

## R0008 FUNCTIONAL DESCRIPTION-

R0009 PART OF A SECTION OF PROGRAMS, -WAITLIST, TASKOVER, T3RUPT, USED TO CALL A PROGRAM, (CALLED A TASK),  
 R0011 WHICH IS TO BEGIN IN C(A) CENTISECONDS. WAITLIST UPDATES TIME3, LST1 AND LST2. THE MEANING OF THESE LISTS  
 R0013 FOLLOW.

R0014 C(TIME3) = 16384 -(T1-T) CENTISECONDS, (T=PRESENT TIME, T1-TIME FOR TASK1)

R0016

R0017 C(LST1) = -(T2-T1)+1  
 R0018 C(LST1 +1) = -(T3-T2)+1  
 R0019 C(LST1 +2) = -(T4-T3)+1

R0020

R0021

R0022

R0023

C(LST1 +6) = -(T8-T7)+1

C(LST1 +7) = -(T9-T8)+1

R0024

R0025

R0026

R0027

R0028

R0029

C(LST2) = 2CADR OF TASK1

C(LST2 +2) = 2CADR OF TASK2

## R0030 WARNINGS-

R0031

- 1) 1 ± C(A) ± 16250D (1 CENTISECOND TO 162.5 SEC)
- 2) 9 TASKS MAXIMUM
- 3) TASKS CALLED UNDER INTERRUPT INHIBITED
- 4) TASKS END BY TC TASKOVER

## R0038 CALLING SEQUENCE-

R0037 L-1 CA DELTAT (TIME IN CENTISECONDS TO TASK START)  
 R0039 L TC WAITLIST  
 R0040 L+1 2CADR DESIRED TASK  
 R0041 L+2 (MINOR OF 2CADR)  
 R0042 L+3 RELINT (RETURNS HERE)

## R00421 TWIDDLE-

R00422

R00423

R00425

TWIDDLE IS FOR USE WHEN THE TASK BEING SET UP IS IN THE SAME EBANK AND FBANK AS THE USER. IN SUCH CASES, IT IMPROVES UPON WAITLIST BY ELIMINATING THE NEED FOR THE EBANK HALF OF THE 2CADR.

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L WAITLIST

R00427 SAVING A WORD. TWIDDLE IS LIKE WAITLIST IN EVERY RESPECT EXCEPT CALLING SEQUENCE, TO WIT-

R0043 L-1 CA DELTAT  
R00431 L TC TWIDDLE  
R00432 L+1 ADRES DESIRED TASK  
R00433 L+2 RELINT (RETURNS HERE)

R00439 NORMAL EXIT MODES-

R0044 AT L+3 OF CALLING SEQUENCE

R0045 ALARM OR ABORT EXIT MODES-

R0046 TC ABORT  
R0047 OCT 1203 (WAITLIST OVERFLOW - TOO MANY TASKS)

R0048 ERASABLE INITIALIZATION REQUIRED-

R0049 ACCOMPLISHED BY FRESH START, --LST2, ..., LST2 +16 =ENDTASK  
R0050 LST1, ..., LST1 +7 =NEG1/2

R0051 OUTPUT--

R0052 R0053 LST1 AND LST2 UPDATED WITH NEW TASK AND ASSOCIATED TIME.  
DEBRIS-

R0054 CENTRALS- A, Q, L  
R0055 OTHER - WAITEXIT, WAITADR, WAITTEMP, WAITBANK  
R0056 DETAILED ANALYSIS OF TIMING-

R0057 R0059 CONTROL WILL NOT BE RETURNED TO THE SPECIFIED ADDRESS (2CADR) IN EXACTLY DELTA T CENTI SECONDS.  
THE APPROXIMATE TIME MAY BE CALCULATED AS FOLLOWS.

R0060 LET TO = THE TIME OF THE TC WAITLIST  
R0061 LET TS = TO +147U + COUNTER INCREMENTS (SET UP TIME)  
R0062 LET X = TS -(100TS)/100 (VARIANCE FROM COUNTERS)  
R0063 LET Y = LENGTH OF TIME OF INHIBIT INTERRUPT AFTER T3RUPT  
R0064 LET Z = LENGTH OF TIME TO PROCESS TASKS WHICH ARE DUE THIS T3RUPT BUT DISPATCHED EARLIER.  
(Z=0, USUALLY)  
R0065 LET DELTAD = THE ACTUAL TIME TAKEN TO GIVE CONTROL TO 2CADR  
R0066 THEN DELTAD = TS+DELTA T -X +Y +Z +1.05MS\* +COUNTERS\*  
R0067 \*-THE TIME TAKEN BY WAITLIST ITSELF AND THE COUNTER TICKING DURING THIS WAITLIST TIME.

R0072 R0074 IN SHORT, THE ACTUAL TIME TO RETURN CONTROL TO A 2CADR IS AUGMENTED BY THE TIME TO SET UP THE TASK'S  
R0076 R0077 INTERRUPT, ALL COUNTERS TICKING, THE T3RUPT PROCESSING TIME, THE WAITLIST PROCESSING TIME AND THE POSSIBILITY

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## L WAITLIST

0078	REP 14 LAST 169	E3,1400	EBANK= LST1	TASK LISTS IN SWITCHED E BANK.	
0079	REP 1		COLNT 02/WAIT		
00795		5130 0 0004 0 TWIDDLE	INHINT		
0080	REP 204 LAST 1190	5131 54 001 1	TS L	SAVE DELAY TIME IN L	
0081	REP 35 LAST 1155	5132 3 4672 0	CA POSMAX		
0082	REP 287 LAST 1169	5133 26 002 1	ADS Q	CREATING OVERFLOW AND Q-1 IN Q	
0083	REP 25 LAST 1190	5134 3 0006 1	CA BBANK		
00832		5135 0 0008 1	EXTEND		
00834	REP 18 LAST 1190	5136 04 007 1	ROR SUPERBANK		
0084	REP 205 LAST 1193	5137 56 001 0	XCH L		
00849		5140 0 0004 0 WAITLIST	INHINT		
0085	REP 288 LAST 1193	5141 56 002 0	XCH Q	SAVE DELTA T IN Q AND RETURN IN	
0086	REP 1	5142 54 061 1	TS WAITEXIT	WAITEXIT.	
0087		5143 0 0008 1	EXTEND		
0088	REP 2 LAST 1193	5144 5 0061 0	INDEX	IF TWIDDLE, THE TS SKIPS TO HERE	
0089		5145 3 0001 0	WAITADR	PICK UP 2CADR OF TASK.	
0090	REP 1	5146 54 063 0	-1	BBCON WILL REMAIN IN L	
0091	REP 1	5147 3 5155 0	DLY2	ENTRY FROM FIXDELAY AND VARDELAY.	
0092	REP 26 LAST 1193	5150 56 006 1	XCH BBANK		
0093	REP 1	5151 1 3248 0	TCP WAITZ		
R0094		RETURN TO CALLER AFTER TASK INSERTION			
0095	REP 3 LAST 1193	5152 52 062 1	LWLIST DXCH	WAITEXIT	
0096	REP 64 LAST 1190	5153 8 4711 1	AD TWO		
0097		5154 52 006 0	DTCB		
0099	REP 15 LAST 1193	E3,1400	EBANK= LST1		
0100	REP 2 LAST 1193	5155 02063 0	WAITBB BBCON	WAITZ	
R0101		RETURN TO CALLER +2 AFTER WAITING DT SPECIFIED AT CALLER +1.			
0102	REP 289 LAST 1193	5156 50 002 0	FIXDELAY	INDEX Q	BOTH ROUTINES MUST BE CALLED UNDER
0103		5157 3 0000 1	CAP	0	WAITLIST CONTROL AND TERMINATE THE TASK
0104	REP 290 LAST 1193	5158 24 002 0	INCR	0	IN WHICH THEY WERE CALLED.
R0105		RETURN TO CALLER +1 AFTER WAITING THE DT AS ARRIVING IN A.			
0106	REP 291 LAST 1193	5161 56 002 0	VARDELAY	XCH Q	DT TO Q. TASK ADRES TO WAITADR.
0107	REP 2 LAST 1193	5162 54 063 0	TS	WAITADR	BBANK IS SAVED DURING DELAY.
0108	REP 27 LAST 1193	5163 3 0006 1	CA	BBANK	
0109		5164 0 0006 1	EXTEND		
0110	REP 19 LAST 1193	5165 04 007 1	ROR	SUPERBANK	ADD BBANK TO BBCON.
0111	REP 206 LAST 1193	5166 54 001 1	TS	L	
0112	REP 1	5167 3 5172 0	CAP	DELAYEX	
0113	REP 4 LAST 1193	5170 54 061 1	TS	WAITEXIT	GO TO TASKOVER AFTER TASK ENTRY.
0114	REP 1	5171 1 5147 1	TCP	DLY2	

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L WAITLIST  
0115 REP 56 LAST 1059 5172 1 5211 1 DELAYEX TCP TASKOVER -2 RETURNS TO TASKOVER  
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L WAITLIST

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R0116 ENDTASK MUST BE ENTERED IN FIXED-FIXED SO IT IS DISTINGUISHABLE BY ITS ADDRESS ALONE.

0118	REF	16	LAST	1193	E3,1400		EBANK= LST1			
0119	REF	1			5173	72602 0	ENDTASK -2CADR	SVCT3		
0119	REF	1			5174	73714 1				
0120	REF	18	LAST	1038	5175	10 076 1	SVCT3	CCS FLAGRD2	DRIFT FLAG	
0121	REF	57	LAST	1194	5176	1 5213 0		TCP	TASKOVER	
0122	REF	58	LAST	1195	5177	1 5213 0		TCP	TASKOVER	
0123					5200	1 5201 0		TCP	+1	
01231	REF	2	LAST	188	5201	11<322 1		CCS	IMUADR	DON'T DO NBONLY IF SOMEONE ELSE IS IN IMUSTALL.
01232	REF	59	LAST	1195	5202	1 5213 0		TCP	TASKOVER	
01233					5203	1 5208 1		TCP	+3	
01234	REF	60	LAST	1195	5204	1 5213 0		TCP	TASKOVER	
01235	REF	61	LAST	1195	5205	1 5213 0		TCP	TASKOVER	
0124	REF	1			5206	3 7672 0	+3	CAP	PRI035	COMPENSATE FOR NBD COEFFICIENTS ONLY.
0125	REF	30	LAST	986	5207	0 5027 1		TC	NOVAC	ENABLE EVERY 81.93 SECONDS
0126	REF	7	LAST	776	E3,1460			EBANK= NBDX		
0127	REF	1			5210	03542 1		2CADR	NBONLY	
0127	REF	1			5211	14063 1				
0128	REF	62	LAST	1195	5212	1 5213 0		TCP	TASKOVER	

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P0129 BEGIN TASK INSERTION.

0130	0131	REP 1	01,3246	BANK 01		
				COUNT 01/WAIT		
0132	REP 1	01,3246	54 062 1	WAIT2	TS WAITBANK	
0133	REP 2 LAST 166	01,3247	4 0026 1		CS TIME3	
0134	REP 27 LAST 1128	01,3250	6 4703 1		AD BIT8	
0135	REP 329 LAST 1169	01,3251	10 000 0		CCS A	
A0136					BIT 6 = OCT 200	
A0137					TEST 200 - C(TIME3).	
A0138					IF POSITIVE, C(TIME3) = T - T1, INSTEAD OF 1.0 - (T1 - T). THE FOLLOWING FOUR ORDERS SET C(A) = TD - T1 + 1 IN EITHER CASE.	
0139	REP 2 LAST 1174	01,3252	6 6056 1	AD	OCT4000I	
0140	REP 330 LAST 1196	01,3253	4 0000 0	CS	A	
R0141	NORMAL CASE (C(A) NNZ) YIELDS SAME C(A): -( - (1.0 - (T1 - T)) + 200) - I					OVERFLOW HAS OCCURRED. SET C(A) =
0142	REP 1	01,3254	6 3402 1	AD	OCT40201	
0143	REP 292 LAST 1193	01,3255	6 0002 0	AD	Q	
0144	REP 331 LAST 1196	01,3256	10 000 0	CCS	A	
0145	REP 17 LAST 1195	01,3257	6 1400 I	AD	LST1	
0146	REP 1	01,3260	1 3322 0	TOP	WTSTS	
0147		01,3261	13 282 0	NOOP		
0148	REP 293 LAST 1196	01,3262	4 0002 1	CS	Q	
R0149	NOTE THAT THIS PROGRAM SECTION IS NEVER ENTERED WHEN T-T1 G/E -I,					
R0150	SINCE TD-T1+1 = (TD-T) + (T-T1+1), AND DELTA T = TD-T G/E +1. (G/E					
R0151	SYMBOL MEANS GREATER THAN OR EQUAL TO). THUS THERE NEED BE NO CON-					
R0152	CERN OVER A PREVIOUS OR IMMINENT OVERFLOW OF TIME3 HERE.					
0153	REP 6 LAST 1057	01,3263	6 4675 I	AD	POS1/2	WHEN TD IS NEXT, FORM QUANTITY
0154	REP 9 LAST 1196	01,3264	6 4675 I	AD	POS1/2	1.0 - DELTAT T = 1.0 - (TD - T)
0155	REP 3 LAST 1196	01,3265	56 026 0	XCH	TIME3	
0156	REP 12 LAST 1118	01,3266	6 4674 0	AD	NEQMAX	
0157	REP 294 LAST 1196	01,3267	6 0002 0	AD	Q	1.0 - DELTAT T NOW COMPLETE.
0158		01,3270	0 0006 1	EXTEND		ZERO INDEX Q.
0159		01,3271	22 007 0	QXCH	7	(ZQ)

## L WAITLIST

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0160	RSP	18	LAST	1196	01,3272	57*400 1	WILST4	XCH	LST1	
0161	RSP	19	LAST	1197	01,3273	57*401 0		XCH	LST1 +1	
0162	RSP	20	LAST	1197	01,3274	57*402 0		XCH	LST1 +2	
0163	RSP	21	LAST	1197	01,3275	57*403 1		XCH	LST1 +3	
0164	RSP	22	LAST	1197	01,3276	57*404 0		XCH	LST1 +4	
0165	RSP	23	LAST	1197	01,3277	57*405 1		XCH	LST1 +5	
0166	RSP	24	LAST	1197	01,3300	57*406 1		XCH	LST1 +6	
0167	RSP	25	LAST	1197	01,3301	57*407 0		XCH	LST1 +7	
0168	RSP	3	LAST	1193	01,3302	3 0063 1		CA	WAITADR	(MINOR PART OF TASK CADR HAS BEEN IN L.)
0169	RSP	295	LAST	1196	01,3303	50 002 0		INDEX	0	
0170					01,3304	1 3305 0		TCP	+1	
0171	RSP	19	LAST	187	01,3305	53*411 0		DXCH	LST2	
0172	RSP	20	LAST	1197	01,3308	53*413 1		DXCH	LST2 +2	
0173	RSP	21	LAST	1197	01,3307	53*415 1		DXCH	LST2 +4	
0174	RSP	22	LAST	1197	01,3310	53*417 0		DXCH	LST2 +6	
0175	RSP	23	LAST	1197	01,3311	53*421 0		DXCH	LST2 +8D	
0176	RSP	24	LAST	1197	01,3312	53*423 1		DXCH	LST2 +10D	
0177	RSP	25	LAST	1197	01,3313	53*425 1		DXCH	LST2 +12D	
0178	RSP	26	LAST	1197	01,3314	53*427 0		DXCH	LST2 +14D	
0179	RSP	27	LAST	1197	01,3315	53*431 1		DXCH	LST2 +16D	
0180	RSP	3	LAST	187	01,3318	8 5173 1		AD	ENDTASK	
A0181										
0182					01,3317	0 0006 1		EXTEND		
0183	RSP	1			01,3320	1 5152 0		B2P	LWWTLIST	
0184	RSP	1			01,3321	1 3375 1		TCP	WTABORT	

AT END, CHECK THAT C(LST2+10) IS STD

END ITEM, AS CHECK FOR EXCEEDING  
THE LENGTH OF THE LIST.  
DUMMY TASK ADRES SHOULD BE IN FIXED-  
FIXED SO ITS ADRES ALONE DISTINGUISHES  
IT.

## L WAITLIST

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0185	REF 332	LAST 1196	01,3322	10 000 0	WILST5	CCS	A	TEST TD - T2 + 1
0186	REF 26	LAST 1197	01,3323	8 1401 0		AD	LST1 +1	
0187			01,3324	1 3330 0		TCP	+4	
0188	REF 144	LAST 1188	01,3325	8 4712 1		AD	ONE	
0189	REF 1		01,3326	0 3403 0		TC	WILST2	
0190			01,3327	00001 0		OCT	1	
0191	REF 333	LAST 1198	01,3330	10 000 0	+4	CCS	A	TEST TD - T3 + 1
0192	REF 27	LAST 1198	01,3331	8 1402 0		AD	LST1 +2	
0193			01,3332	1 3338 0		TCP	+4	
0194	REF 145	LAST 1198	01,3333	8 4712 1		AD	ONE	
0195	REF 2	LAST 1198	01,3334	0 3403 0		TC	WILST2	
0196			01,3335	00002 0		OCT	2	
0197	REF 334	LAST 1198	01,3336	10 000 0	+4	CCS	A	TEST TD - T4 + 1
0198	REF 28	LAST 1198	01,3337	8 1403 1		AD	LST1 +3	
0199			01,3340	1 3344 0		TCP	+4	
0200	REF 146	LAST 1198	01,3341	8 4712 1		AD	ONE	
0201	REF 3	LAST 1198	01,3342	0 3403 0		TC	WILST2	
0202			01,3343	00003 1		OCT	3	
0203	REF 335	LAST 1198	01,3344	10 000 0	+4	CCS	A	TEST TD - T5 + 1
0204	REF 29	LAST 1198	01,3345	8 1404 0		AD	LST1 +4	
0205			01,3346	1 3352 1		TCP	+4	
0206	REF 147	LAST 1198	01,3347	8 4712 1		AD	ONE	
0207	REF 4	LAST 1198	01,3350	0 3403 0		TC	WILST2	
0208			01,3351	00004 0		OCT	4	
0209	REF 338	LAST 1198	01,3352	10 000 0	+4	CCS	A	TEST TD - T6 + 1
0210	REF 30	LAST 1198	01,3353	8 1405 1		AD	LST1 +5	
0211			01,3354	1 3380 0		TCP	+4	
0212	REF 148	LAST 1198	01,3355	8 4712 1		AD	ONE	
0213	REF 5	LAST 1198	01,3356	0 3403 0		TC	WILST2	
0214			01,3357	00005 1		OCT	5	
0215	REF 337	LAST 1198	01,3360	10 000 0	+4	CCS	A	TEST TD - T7 + 1
0216	REF 31	LAST 1198	01,3361	8 1406 1		AD	LST1 +6	
0217			01,3362	1 3388 0		TCP	+4	
0218	REF 149	LAST 1198	01,3363	8 4712 1		AD	ONE	
0219	REF 6	LAST 1198	01,3364	0 3403 0		TC	WILST2	
0220			01,3365	00006 1		OCT	6	

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0221	REP 338	LAST 1198	01,3366	10 000 0	+4	CCS	A
0222	REP 32	LAST 1198	01,3367	6 1407 0		AD	LST1 +7
0223			01,3370	1 3374 0		TCP	+4
0224	REP 150	LAST 1198	01,3371	6 4712 1		AD	ONE
0225	REP 7	LAST 1198	01,3372	0 3403 0		TC	WTLST2
0226			01,3373	00007 0		OCT	7
0227	REP 339	LAST 1199	01,3374	10 000 0	+4	CCS	A
0228	REP 8	LAST 1182	01,3375	0 5604 0	WTABORT	TC	BAILOUT
0229			01,3376	01203 1		OCT	1203
0230	REP 151	LAST 1199	01,3377	6 4712 1		AD	ONE
0231	REP 8	LAST 1199	01,3400	0 3403 0		TC	WTLST2
0232			01,3401	00010 0		OCT	10
0233			01,3402	40201 0	OCT40201	OCT	40201

NO ROOM IN THE INN.

L WAITLIST

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R0234 THE ENTRY TO WILST2 JUST PRECEDING OCT N IS FOR T LE TD LE T -1.  
R0235 N N+1R0236 (LE MEANS LESS THAN OR EQUAL TO). AT ENTRY, C(A) = -(TD - T + 1)  
R0237 N+1R0238 THE LST1 ENTRY -(T - T + 1) IS TO BE REPLACED BY -(TD - T + 1), AND  
R0239 N+1 NR0240 THE ENTRY -(T - TD + 1) IS TO BE INSERTED IMMEDIATELY FOLLOWING.  
R0241 N+1

0242	REP 1	01,3403	54 064 1	WILST2	TS	WAITTEMP	C(A) = -(TD - T + 1)
0243	REP 296 LAST 1197	01,3404	50 002 0		INDEX	Q	
0244		01,3405	3 0000 1		CAP	0	
0245	REP 297 LAST 1200	01,3406	54 002 1		TS	Q	INDEX VALUE INTO Q.
0246	REP 152 LAST 1199	01,3407	3 4712 1		CAP	ONE	
0247	REP 2 LAST 1200	01,3410	8 0064 0		AD	WAITTEMP	
0248	REP 298 LAST 1200	01,3411	50 002 0		INDEX	Q	C(A) = -(TD - T ) + 1.
0249	REP 33 LAST 1199	01,3412	27<377 1		ADS	LST1 -1	N
0250	REP 3 LAST 1200	01,3413	4 0064 1		CS	WAITTEMP	
0251	REP 299 LAST 1200	01,3414	50 002 0		INDEX	Q	
0252	REP 1	01,3415	1 3272 1		TCP	WILST4	

R0253 C(TIME3) = 1.0 - (T1 - T)

R0254 C(LST1 ) = - (T2 - T1) + 1  
 R0255 C(LST1+1) = - (T3 - T2) + 1  
 R0256 C(LST1+2) = - (T4 - T3) + 1  
 R0257 C(LST1+3) = - (T5 - T4) + 1  
 R0258 C(LST1+4) = - (T6 - T5) + 1

R0259 C(LST2 ) = 2CADR TASK1  
 R0260 C(LST2+2 ) = 2CADR TASK2  
 R0261 C(LST2+4 ) = 2CADR TASK3  
 R0262 C(LST2+6 ) = 2CADR TASK4  
 R0263 C(LST2+8 ) = 2CADR TASK5  
 R0264 C(LST2+10) = 2CADR TASK6

L WAITLIST

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P0265 ENTERS HERE ON T3 RUPT TO DISPATCH WAITLISTED TASK.

0266	REP	01,3416	0 0008 1	T3RUPT	EXTEND			
0267	REP	20	LAST 1193	01,3417	04 007 1	ROR	SUPERBANK	
0268	REP	22	LAST 1088	01,3420	54 016 1	TS	BANKRUPT	
0269				01,3421	0 0006 1	EXTEND		
0270	REP	18	LAST 1088	01,3422	22 012 1	DXCH	RUPT	
0271	REP	9	LAST 1170	01,3423	3 4873 1	T3RUPT2	CAP	NEG1/2
0272	REP	34	LAST 1200	01,3424	57<407 0	XCH	LST1 +7	
0273	REP	35	LAST 1201	01,3425	57<408 1	XCH	LST1 +6	
0274	REP	36	LAST 1201	01,3426	57<405 1	XCH	LST1 +5	
0275	REP	37	LAST 1201	01,3427	57<404 0	XCH	LST1 +4	
0276	REP	38	LAST 1201	01,3430	57<403 1	XCH	LST1 +3	
0277	REP	39	LAST 1201	01,3431	57<402 0	XCH	LST1 +2	
0278	REP	40	LAST 1201	01,3432	57<401 0	XCH	LST1 +1	
0279	REP	41	LAST 1201	01,3433	57<400 1	XCH	LST1	
0280	REP	36	LAST 1193	01,3434	6 4872 0	AD	POSMAX	
0281	REP	4	LAST 1198	01,3435	28 028 1	ADS	TIME3	
0282	REP	3	LAST 577	01,3438	54 734 0	TS	RUPTAGN	
0283	REP	246	LAST 1190	01,3437	4 4714 0	CS	ZERO	
0284	REP	4	LAST 1201	01,3440	54 734 0	TS	RUPTAGN	
0285				01,3441	0 0008 1	EXTEND		
0286	REP	4	LAST 1197	01,3442	4 5174 1	DC8	ENDTASK	
0287	REP	28	LAST 1197	01,3443	53<431 1	DXCH	LST2 +16D	
0288	REP	29	LAST 1201	01,3444	53<427 0	DXCH	LST2 +14D	
0289	REP	30	LAST 1201	01,3445	53<425 1	DXCH	LST2 +12D	
0290	REP	31	LAST 1201	01,3446	53<423 1	DXCH	LST2 +10D	
0291	REP	32	LAST 1201	01,3447	53<421 0	DXCH	LST2 +8D	
0292	REP	33	LAST 1201	01,3450	53<417 0	DXCH	LST2 +6	
0293	REP	34	LAST 1201	01,3451	53<415 1	DXCH	LST2 +4	
0294	REP	35	LAST 1201	01,3452	53<413 1	DXCH	LST2 +2	
0295	REP	36	LAST 1201	01,3453	53<411 0	DXCH	LST2	
0296	REP	207	LAST 1193	01,3454	58 001 0	XCH	L	
0297				01,3455	0 0006 1	EXTEND		
0298	REP	21	LAST 1201	01,3456	01 007 1	WRITE	SUPERBANK	
0299	REP	208	LAST 1201	01,3457	58 001 0	XCH	L	
0300				01,3460	52 008 0	DTCH		

READ CURRENT SUPERBANK VALUE AND  
SAVE WITH E AND F BANK VALUES.

DISPATCH WAITLIST TASK.

1. MOVE UP LST1 CONTENTS, ENTERING  
A VALUE OF 1/2 +1 AT THE BOTTOM  
FOR T8-T5, CORRESPONDING TO THE  
INTERVAL 61.91 SEC FOR ENDTASK.2. SET T3 = 1.0 - T2 - T USING LIST 1.  
SO T3 WONT TICK DURING UPDATE.

SETS RUPTAGN TO +1 ON OVERFLOW.

DISPATCH TASK.

SET SUPERBANK FROM BBCON OF 2CADR  
RESTORE TO L FOR DXCH Z.

L WAITLIST

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P0301 RETURN, AFTER EXECUTION OF T3 OVERFLOW TASK

0302		5213		BLOCK 02		
0303	REP	2 LAST 1193 TO 1196	51 51*	COUNT 02/WAIT		
0304	REP	5 LAST 1201	5213 10 734 0	TASKOVER CCS	RUPTAGN	IP +1 RETURN TO T3RUPT, IP -0 RESUME.
0305	REP	2 LAST 1193	5214 3 5155 0	CAF	WAITBB	
0306	REP	28 LAST 1193	5215 54 008 0	TS	BBANK	
0307	REP	1	5216 1 3423 0	TCP	T3RUPT2	DISPATCH NEXT TASK IF IT WAS DUE.
0308	REP	23 LAST 1201	5217 3 0016 0	CA	BANKRUPT	
0309			5220 0 0006 1	EXTEND		
0310	REP	22 LAST 1201	5221 01 007 1	WRITE	SUPERBNK	RESTORE SUPERBNK BEFORE RESUME IS DONE
0311						
0312	REP	19 LAST 1201	5222 0 0006 1	RESUME	EXTEND	
0313	REP	24 LAST 1202	5223 22 012 1	XCH	GRUPT	
0314	REP	29 LAST 1202	5224 3 0016 0	NOQRSW	CA BANKRUPT	
0315	REP	11 LAST 128	5225 56 006 1	XCH	BBANK	
03155			5226 52 011 0	NOQRSW	DXCH ARUPT	
0316			5227 0 0003 1	RELINT		
			5230 5 0017 1	RESUME		

L WAITLIST

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P0317 LONGCALL

R0318 PROGRAM DESCRIPTION  
 R0319 PROGRAM WRITTEN BY W.H. VANDEVER  
 R0320 MOD BY- R. MELANSON TO ADD DOCUMENTATION

DATE- 17 MARCH 1987  
 LOG SECTION WAITLIST  
 ASSEMBLY SUNDISK REV. 100

R0321 FUNCTIONAL DESCRIPTION-

R0322 LONGCALL IS CALLED WITH THE DELTA TIME ARRIVING IN A,L SCALED AS TIME2,TIME1 WITH THE 2CADR OF THE TASK  
 R0324 IMMEDIATELY FOLLOWING THE TC LONGCALL. FOR EXAMPLE, IT MIGHT BE DONE AS FOLLOWS WHERE TIMELOC IS THE NAME OF  
 R0328 A DP REGISTER CONTAINING A DELTA TIME AND WHERE TASKTODO IS THE NAME OF THE LOCATION AT WHICH LONGCALL IS TO  
 R0329 START

R0329 CALLING SEQUENCE-

A0330  
 A0331  
 A0332  
 A0333

EXTEND  
 DCA TIMELOC  
 TC LONGCALL  
 2CADR TASKTODO

R0334 NORMAL EXIT MODE-

R0335 1). TC WAITLIST  
 R0336 2). DTCB (TO L+3 OF CALLING ROUTINE 1ST PASS THRU LONGCYCL)  
 R0337 3). DTCB (TO TASKOVER ON SUBSEQUENT PASSES THRU LONGCYCL)

R0338 ALARM OR ABORT EXIT MODE-

R0339 NONE

R0340 OUTPUT-

R0341 LONGTIME AND LONGTIME+1 = DELTA TIME  
 R0342 LONGEXIT AND LONGEXIT+1 = RETURN 2CADR  
 R0343 LONGCADR AND LONGCADR+1 = TASK 2CADR  
 R0344 A = SINGLE PRECISION TIME FOR WAITLIST

R0345 ERASABLE INITIALIZATION-

R0346 A = MOST SIGNIFICANT PART OF DELTA TIME  
 R0347 L = LEAST SIGNIFICANT PART OF DELTA TIME  
 R0348 Q = ADDRESS OF 2CADR TASK VALUE

R0349 DEBRIS-

R0350 A,Q,L  
 R0351 LONGCADR AND LONGCADR+1  
 R0352 LONGEXIT AND LONGEXIT+1  
 R0353 LONGTIME AND LONGTIME+1

R0354 \*\*\* THE FOLLOWING IS TO BE IN FIXED-FIXED AND UNSWITCHED ERASABLE \*\*\*

0355	5231	BLOCK 02	
0356	REF 42 LAST 1201 E3,1400	ERANK= LST1	OBTAİN THE DELTA TIME
0357	REF 1 5231 53*140 1 LONGCALL DXCH LONGTIME		
0358	5232 0 0006 1	EXTEND	OBTAİN THE 2CADR

## L WAITLIST

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0350	REF 300 LAST 1200	5233 5 0002 0	NDX Q		
0360		5234 3 0001 0	DCA 0		
0361	REF 1	5235 53=134 1	DXCH LONGCADR		
0362		5236 0 0006 1	EXTEND		
0363	REF 1	5237 3 5242 0	DCA LOCL2CDR	NOW GO TO THE APPROPRIATE SWITCHED BANK	
0364		5240 52 006 0	DTCS	FOR THE REST OF LONGCALL	
0365	REF 43 LAST 1203	E3,1400	EBANK= LST1		
0366	REF 1	5241 03461 1	LOCL2CDR 2CADR	LNGCALL2	
0366	REF 1	5242 02063 0			
R0367	*** THE FOLLOWING MAY BE IN A SWITCHED BANK, INCLUDING ITS ERASABLE ***				
0368		01,3461	BANK 01		
0369	REF 2 LAST 1198 TO 1202'	139 139*	COUNT 01/WAIT		
0370	REF 1	01,3461 23=435 1	LNGCALL2 LXCH	LONGEXIT +1	
0371	REF 65 LAST 1193	01,3462 3 4711 1	CA TWO	SAVE THE CORRECT BB FOR RETURN	
0372	REF 301 LAST 1204	01,3463 26 002 1	ADS Q	OBTAIN IN THE RETURN ADDRESS	
0373	REF 2 LAST 1204	01,3464 55=434 1	TS LONGEXIT		
R0374	*** WAITLIST TASK LONGCYCL ***				
0375		01,3465 0 0006 1	LONGCYCL EXTEND	CAN WE SUCCESSFULLY TAKE ABOUT 1.25	
0376	REF 1	01,3466 4 3477 1	DCS DPBIT14	MINUTES OFF OF LONGTIME	
0377	REF 2 LAST 1203	01,3467 21=140 1	DAS LONGTIME		
0378	REF 3 LAST 1204	01,3470 11=140 1	CCS LONGTIME +1	THE REASONING BEHIND THIS PART IS	
0379	REF 1	01,3471 1 3510 1	TCP MUCHTIME	INVOLVED, TAKING INTO ACCOUNT THAT THE	
A0380				WORDS MAY NOT BE SIGNED CORRECTED (DP	
A0381				BASIC INSTRUCTIONS	
A0382				DO NOT SIGN CORRECT) AND THAT WE SUBTRACTED	
A0383				BIT14 (1 OVER HALF THE POS. VALUE	
A0384				REPRESENTABLE IN SINGLE WORD)	
0385		01,3472 13 473 0	NOOP	CAN'T GET HERE *****	
0386		01,3473 1 3474 1	TCP +1		
0387	REF 4 LAST 1204	01,3474 11=137 1	CCS LONGTIME		
0388	REF 2 LAST 1204	01,3475 1 3510 1	TCP MUCHTIME		
0389		01,3476 00000 1	DPBIT14 OCT 00000		
0390		01,3477 20000 0	OCT 20000		
A0391				LONGCALL	
0392	REF 71 LAST 1174	01,3500 3 4675 1	LASTTIME CA BIT14	GET BACK THE CORRECT DELTA FOR WAITLIST	
0393	REF 5 LAST 1204	01,3501 27=140 1	ADS LONGTIME +1		
0395	REF 50 LAST 1058	01,3502 0 5140 1	TC WAITLIST		
0396	REF 44 LAST 1204	E3,1400	EBANK= LST1		
0397	REF 1	01,3503 03515 0	2CADR GETCADR	THE ENTRY TO OUR LONGCADR	
0397	REF 1	01,3504 02063 0			
0399	REF 1	01,3505 3 3517 1	LONGRTRN CA TSKOVCDR	SET IT UP SO THAT ONLY THE FIRST EXIT IS	

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L WAITLIST

0400	REP	3	LAST 1204	01,3506	53-435 0	DxCH	LONGEXIT
0401				01,3507	52 006 0	DTCB	
0402	REP	72	LAST 1204	01,3510	3 4875 1	MUCHTIME CA	BIT14
0404	REP	51	LAST 1204	01,3511	0 5140 1	TC	WAITLIST
0405	REP	45	LAST 1204	E3,1400		EBANK= LST1	
0406	REP	1		01,3512	03485 0	2CADR	LONGCYCL
0406	REP	1		01,3513	02063 0		
0408	REP	1		01,3514	1 3505 0	TOP	LONGRTRN
0409			*** WAITLIST TASK GETCADR ***				
0410	REP	2	LAST 1204	01,3515	53-134 1	GETCADR	DxCH
0411				01,3516	52 006 0		LONGADR
0412	REP	63	LAST 1195	01,3517	05213 1	TSKOVCDR GENADR	TASKOVER

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TO THE CALLER OF LONGCALL.  
THE REST ARE TO TASKOVER

WE HAVE OVER OUR ABOUT 1.25 MINUTES  
SO SET UP FOR ANOTHER CYCLE THROUGH HERE

NOW EXIT PROPERLY

GET THE LONGCALL THAT WE WISHED TO START  
AND TRANSFER CONTROL TO IT

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L LATITUDE LONGITUDE SUBROUTINES

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R0001 SUBROUTINE TO CONVERT RAD VECTOR AT GIVEN TIME TO LAT, LONG AND ALT

R0002 CALLING SEQUENCE

R0003 L-1 CALL

R0004 L LAT-LONG

R0005 SUBROUTINES USED

R0006 R-TO-RP, ARCTAN, SETGAMMA, SETRE

R0007 ERASABLE INIT. REQ.

R0008 AXO, -AYO, AZO, TEPHEN (SET AT LAUNCH TIME)

R0009 ALPHAV = POSITION VECTOR METERS B-29

R0010 MPAC-- TIME (CSECS B-28)

R0011 ERADFLAG =1, TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS

R0012 LUNAPLAG=0 FOR EARTH, 1 FOR MOON

R0013 OUTPUT

R0014 LATITUDE IN LAT (REVS. B-0)

R0015 LONGITUDE IN LONG (REVS. B-0)

R0016 ALTITUDE IN ALT METERS B-29

0017 REP 1 30,3776  
0018 13,2000  
0019 13,2322

BANK 30  
SETLOC LATLONG  
BANK

0020 REP 1

COUNT 13/LT-LG

0021 REP 19 LAST 894 E4,1551  
0022 13,2322 40220 0 LAT-LONG STO SETPD  
0023 REP 1 13,2323 02242 1 INCORPEx  
0024 13,2324 00001 0 0D  
0025 13,2325 24007 0 STOVL 6D  
0026 REP 20 LAST 1206 13,2326 02152 0 ALPHAV  
0027 13,2327 51406 1 PUSH ABVAL  
0028 REP 2 LAST 68 13,2330 16310 1 STOOL ALPHAV  
0029 REP 6 LAST 1176 13,2331 11456 0 ZEROVEC  
0030 13,2332 71414 0 BOPP COS  
0031 REP 24 LAST 694 13,2333 01743 0 LUNAPLAG  
0032 REP 1 13,2334 26335 0 CALLRTRP  
0033 13,2335 77624 1 CALLRTRP CALL  
0034 REP 3 LAST 599 13,2336 55366 1 R-TO-RP  
0035 13,2337 77656 1 UNIT  
0036 REP 21 LAST 1206 13,2340 36152 1 STCALL ALPHAV  
0037 REP 1 13,2341 26523 1 SETGAMMA  
0038 13,2342 77624 1 CALL  
0039 REP 2 LAST 592 13,2343 26533 0 SETRE  
0040 13,2344 63545 0 DLOAD DSQ  
0041 REP 22 LAST 1206 13,2345 02152 0 ALPHAV  
0042 13,2346 63525 0 PDDL DSQ  
0043 REP 23 LAST 1206 13,2347 02154 0 ALPHAV +2

SAVE TIME IN 6-7D FOR R-TO-RP

0-5D= R FOR R-TO-RP  
ABS. VALUE OF R FOR ALT FORMULA BELOW  
SET MPAC=0 FOR EARTH, NON-ZERO FOR MOON  
USE COS(0) TO GET NON-ZERO IN MPAC  
0=EARTH, 1=MOON

RP VECTOR CONVERTED FROM R B-29  
UNIT RP B-1  
U2= 1/2 SINL FOR SETRE SUBR BELOW  
SET GAMMA=B2/A2 FOR EARTH, =1 FOR MOON  
SCALD B-1  
CALC RE METERS B-29

L LATITUDE LONGITUDE SUBROUTINES

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0044		13,2350	75415 0	DAD	SQRT		
0045		13,2351	76405 1	DMP	SL1R		
0046	REF 1	13,2352	00011 1		GAMRP		
0047	REF 5 LAST 838	13,2353	14021 1	STOOL	COTH	COS(LAT) B-1	
0048	REF 24 LAST 1206	13,2354	02158 1		ALPHAV +4	SIN(LAT) B-1	
0049	REF 5 LAST 838	13,2355	34023 1	STCALL	SINTH	ARCTAN	
0050	REF 1	13,2356	26483 1		LAT	LAT B0	
0051	REF 14 LAST 690	13,2357	15104 0		ALPHAV		
0052	REF 25 LAST 1207	13,2360	02152 0	STOOL	COTH	COS(LONG) B-1	
0053	REF 6 LAST 1207	13,2361	14021 1		ALPHAV +2	SIN(LONG) B-1	
0054	REF 26 LAST 1207	13,2362	02154 0	STCALL	SINTH	ARCTAN	
0055	REF 6 LAST 1207	13,2363	34023 1		LONG	LONG. REVS B-0 IN RANGE -1/2 TO 1/2	
0056	REF 2 LAST 1207	13,2364	26483 1		ALPHAM	ALPHAM	
0057	REF 10 LAST 889	13,2365	15106 1	DSU	ERADM	ALT= R-RE METERS B-29	
0058	REF 3 LAST 1206	13,2366	02310 1		STCALL	ALT	EXIT WITH ALT METERS B-29
0059		13,2367	77625 0		INCORPEX		
0060	REF 7 LAST 764	13,2370	02241 1				
0061	REF 7 LAST 634	13,2371	35110 1				
0062	REF 2 LAST 1206	13,2372	02242 1				

## L LATITUDE LONGITUDE SUBROUTINES

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P0063 SUBROUTINE TO CONVERT LAT, LONG, ALT AT GIVEN TIME TO RADIUS VECTOR  
P0064 CALLING SEQUENCER0065 L-1 CALL  
R0066 L LALOTORV  
R0067 SUBROUTINES USEDR0068 SETGAMMA, SETRE, RP-TO-R  
R0069 ERASABLE INIT. REQ.R0070 AXO, AYO, AZO, TEPHEM SET AT LAUNCH TIME  
R0071 LAT-- LATITUDE (REVS B0)  
R0072 LONG-- LONGITUDE (REVS B0)  
R0073 ALT-- ALTITUDE (METERS) B-29  
R0074 MPAC-- TIME (CSECS B-28)  
R0075 ERADFLAG=1 TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS  
R0076 LUNARFLAG=0 FOR EARTH, 1 FOR MOON  
R0077 OUTPUT

## R0078 R-VECTOR IN ALPHAV (METERS B-29)

0079	13,2373	40220 0	LALOTORV	STQ	SETPD	LAT, LONG, ALT TO R VECTOR
0080	REP 3 LAST 1207	13,2374 02242 1			INCORPEx	
0081		13,2375 00001 0			00	
0082		13,2376 34007 1		STCALL	6D	
0083	REP 2 LAST 1206	13,2377 26523 1			SETGAMMA	6-7D= TIME FOR RP-TO-R
0084		13,2400 73545 1		DLOAD	SIN	GAMMA=B2/A2 FOR EARTH, 1 FOR MOON B-1
0085	REP 15 LAST 1207	13,2401 01104 0			LAT	COS(LONG)COS(LAT) IN MPAC
0086		13,2402 65275 1		DMPR	PDOL	UNIT RP= SIN(LONG)COS(LAT) 2-3D
0087	REP 2 LAST 1207	13,2403 00011 1			GAMRP	PD 2 GAMMA*SIN(LAT) 0-1D
0088	REP 16 LAST 1208	13,2404 01104 0			LAT	0-1D= GAMMA*SIN(LAT) B-2
0089		13,2405 65346 0		COS	PDOL	2-3D=COS(LAT) B-1 TEMPORARILY
0090	REP 11 LAST 1207	13,2406 01108 1			LONG	
0091		13,2407 57356 0		SIN	DMPR	PD 2
0092		13,2410 71525 0		PDOL	COS	PD 4 2-3D=SIN(LONG)COS(LAT) B-2
0093	REP 17 LAST 1208	13,2411 01104 0			LAT	
0094		13,2412 71525 0		PDOL	COS	PD 6 4-5D=COS(LAT) B-1 TEMPORARILY
0095	REP 12 LAST 1208	13,2413 01106 1			LONG	
0096		13,2414 55475 1		DMPR	VDEF	PD 4 MPAC= COS(LONG)COS(LAT) B-2
0097		13,2415 41456 0		UNIT	PUSH	0-5D= UNIT RP FOR RP-TO-R SUBR.
0098	REP 27 LAST 1207	13,2416 36152 1		STCALL	ALPHAV	ALPHAV +4= SINL FOR SETRE SUBR.
0099	REP 3 LAST 1206	13,2417 26533 0			SETRE	RE METERS B-29
0100		13,2420 43145 0		DLOAD	BOPP	SET MPAC=0 FOR EARTH, NON-ZERO FOR MOON
0101	REP 7 LAST 1206	13,2421 11456 0			ZEROVBC	
0102	REP 25 LAST 1206	13,2422 01743 0			LUNARFLAG	
0103	REP 1	13,2423 26425 0			CALLRPRT	
0104		13,2424 77746 1		COS		USE COS(0) TO GET NON-ZERO IN MPAC
0105		13,2425 77624 1	CALLRPRT	CALL	RP-TO-R	
0106	REP 7 LAST 894	13,2426 55341 1			ALPHAV	EXIT WITH UNIT R VECTOR IN MPAC
0107	REP 28 LAST 1208	13,2427 16152 0		STOOL	ERADM	
0108	REP 8 LAST 1207	13,2430 02241 1				

## L LATITUDE LONGITUDE SUBROUTINES

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0109	REF 8 LAST 1207	13,2431	74215 1	DAD	VXSC	(R <sub>E</sub> + ALT)(UNIT R) METERS B-30
0110	REF 29 LAST 1208	13,2432	01110 0		ALT	
0111		13,2433	02152 0		ALPHAV	
0112		13,2434	77772 0	VSL1		
0113	REF 30 LAST 1209	13,2435	36152 1	STCALL	ALPHAV	R METERS B-29
0114	REF 4 LAST 1208	13,2436	02242 1		INCORPEx	EXIT WITH R IN METERS B-29
R0115	SUBROUTINE TO COMPUTE EARTH RADIUS					

R0116 INPUT

R0117 1/2 SIN LAT IN ALPHAV +4

R0118 OUTPUT

R0119 EARTH RADIUS IN ERADM AND MPAC (METERS B-29)

0120		13,2437	63545 0	GETERAD	DLOAD	DSQ	
0121	REF 31 LAST 1209	13,2440	02156 1			ALPHAV +4	SIN**2(L)
0122		13,2441	44352 0	SL1		BDSU	
0123	REF 1	13,2442	11454 1			DP1/2	COS**2(L)
0124		13,2443	44275 1	DMPR		BDSU	
0125	REF 1	13,2444	26460 1			EE	
0126	REF 2 LAST 1209	13,2445	11454 1			DP1/2	
0127		13,2446	75465 1	BDDV		SORT	
0128	REF 1	13,2447	26454 0			B2XSC	
0129		13,2450	77622 1	SRAR			
0130	REF 9 LAST 1208	13,2451	02241 1	STORE		ERADM	
0131		13,2452	77618 0			RVQ	

R01311 THE FOLLOWING CONSTANTS WERE COMPUTED WITH A=6376166, B=6356784 METERS

R01312 B2XSC= B\*\*2 SCALED B-51

R01313 B<sub>2</sub>/A<sub>2</sub>= B\*\*2/A\*\*2 SCALED B-1

R01314 EE=(1-B\*\*2/A\*\*2) SCALED B-0

0132		13,2453	00446 1	B2XSC	2DEC	.0179450689	B**2 SCALED B-51
0132		13,2454	00305 1				
0133	REF 4 LAST 1178	04,3453	DP1/2	=	XUNIT		
0134		13,2455	17711 0	B2/A2	2DEC	.9933064684 B-1	GAMMA= B**2/A**2 B-1
0134		13,2456	05254 1				
0135		13,2457	00155 0	EE	2DEC	6.6935116 E-3	(1-B**2/A**2) B-0
0135		13,2460	25250 1				
0136		13,2461	00302 0	ERAD	2DEC	6373338 B-29	PAD RADIUS
0138		13,2462	17755 0				

L LATITUDE LONGITUDE SUBROUTINES

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P0137 ARCTAN SUBROUTINE  
R0138 CALLING SEQUENCER0139 SIN THETA IN SINTH B-1  
R0140 COS THETA IN COSTH B-1  
R0141 CALL ARCTAN

R0142 OUTPUT

R0143 ARCTAN THETA IN MPAC AND THETA B-0 IN RANGE -1/2 TO +1/2

0144	13,2463	77600 1	ARCTAN	BOV	
0145 REP 1	13,2464	28465 1	CLRO/PLW		
0146	13,2465	63545 0	CLRO/PLW	DLOAD	DSQ
0147 REP 7 LAST 1207	13,2466	00023 0			SINTH
0148	13,2467	63525 0		PDDL	DSQ
0149 REP 7 LAST 1207	13,2470	00021 1			COSTH
0150	13,2471	77615 0		DAD	
0151	13,2472	75454 0		BZC	SORT
0152 REP 1	13,2473	28511 0		BDD	ARCTAN0X
0153	13,2474	40065 0			BOV
0154 REP 8 LAST 1210	13,2475	00023 0			SINTH
0155 REP 1	13,2476	28516 1			ATAN=90
0156	13,2477	87542 0		SR1	ASIN
0157 REP 4 LAST 715	13,2500	00025 0		STORE	THETA
0158	13,2501	50125 1		PDDL	BNN
0159 REP 8 LAST 1210	13,2502	00021 1			COSTH
0160 REP 1	13,2503	28505 0			NEGCOS
0161	13,2504	43545 1		DLOAD	RVO
0162	13,2505	57545 1	NEGCOS	DLOAD	DCOMP
0163	13,2506	43244 1		BPL	DAD
0164 REP 1	13,2507	28513 1			NEGOUT
0165 REP 3 LAST 1209	13,2510	11454 1			DP1/2
0166 REP 5 LAST 1210	13,2511	00025 0	ARCTAN0X	STORE	THETA
0167	13,2512	77616 0		RVO	
0168	13,2513	52025 1	NEGOUT	DSU	GOTO
0169 REP 4 LAST 1210	13,2514	11454 1			DP1/2
0170 REP 2 LAST 1210	13,2515	28511 0			ARCTAN0X
0171	13,2516	75345 1	ATAN=90	DLOAD	SIGN
0172 REP 1	13,2517	11502 0			LDPL1/4
0173 REP 9 LAST 1210	13,2520	00023 0			SINTH
0174 REP 6 LAST 1210	13,2521	00025 0		STORE	THETA
0175	13,2522	77616 0		RVO	
0176 REP 2 LAST 706	04,3455		20ZERO	=	DPZERO

## L LATITUDE LONGITUDE SUBROUTINES

USER=3 PAGE NO. 6 E4 S3

P0177 .... SETGAMMA SUBROUTINE ....

R0178 SUBROUTINE TO SET GAMMA FOR THE LAT-LONG AND LALOTORY SUBROUTINES

R0179 GAMMA = B\*\*2/A\*\*2 FOR EARTH (B-1)

R0180 GAMMA = 1 FOR MOON (B-1)

R0181 CALLING SEQUENCE

R0182 L CALL

R0183 L+1 SETGAMMA

R0184 INPUT

R0185 LUNAPLAG=0 FOR EARTH,=1 FOR MOON

R0186 OUTPUT

R0187 GAMMA IN GAMRP (B-1)

0188		13,2523	43145 0	SETGAMMA	DLOAD	BOPP	BRANCH FOR EARTH
0189	REP 1	13,2524	28458 1			B2/A2	EARTH GAMMA
0190	REP 28 LAST 1208	13,2525	01743 0			LUNAPLAG	
0191	REP 1	13,2526	28531 1			SETOMEX	
0192		13,2527	77735 0		SLOAD		
0193	REP 1	13,2530	11454 1			1B1	MOON GAMMA
0194	REP 3 LAST 1208	13,2531	00011 1	SETOMEX	STORE	GAMRP	
0195		13,2532	77616 0		RVO		
0196		0010		GAMRP	=	8D	

## L LATITUDE LONGITUDE SUBROUTINES

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P0197 .....SETRE SUBROUTINE .....

R0198 SUBROUTINE TO SET R0 (EARTH OR MOON RADIUS)

R0199 R0=R4 FOR MOON

R0200 R0=RREF FOR FIXED EARTH RADIUS OR COMPUTED RF FOR FISCHER ELIPSOID

R0201 CALLING SEQUENCE

R0202 L CALL

R0203 L+1 SETRS

R0204 SUBROUTINES USED

R0205 GETERAD

R0206 INPUT

R0207 ERADFLAG=0 FOR FIXED R0, 1 FOR COMPUTED R0

R0208 ALPHAV +4= 1/2 SINL IF GETERAD IS CALLED

R0209 LUNAPLAG=0 FOR EARTH, =1 FOR MOON

R0210 OUTPUT

R0211 ERADM= 504RM FOR MOON (METERS B-29)

R0212 ERADM= ERAD OR COMPUTED RF FOR EARTH (METERS B-29)

0213		13,2533	71220 II	SETRE	STO	DLOAD	
0214	REF	1	13,2534	00051 00		SETREX	
0215	REF	1	13,2535	26560 00		504RM	
0216			13,2536	71214 00	BON	DLOAD	BRANCH FOR MOON
0217	REF	27 LAST 1211	13,2537	01703 II		LUNAPLAG	
0218	REF	1	13,2540	26550 00		TSTRLSRM	
0219	REF	1	13,2541	26462 00		ERAD	
0220			13,2542	45014 00	BOPP	CALL	ERADFLAG=0 FOR FIXED R0, 1 FOR COMPUTED
0221	REF	14 LAST 890	13,2543	00742 00		ERADFLAG	
0222	REF	1	13,2544	26546 II		SETROX	
0223	REF	4 LAST 846	13,2545	26437 00		GETERAD	
0224	REF	10 LAST 1209	13,2546	36241 00	SETROX	STCALL	ERADM
0225	REF	2 LAST 1212	13,2547	00051 00		ERADM	
0226			13,2550	77214 00	TSTRLSRM	BON	SETREX
0227	REF	15 LAST 1212	13,2551	00702 II		VLOAD	ERADFLAG=0, SET R0=RLS
0228	REF	2 LAST 1212	13,2552	26546 II		ERADFLAG	=1 R0=R4
0229	REF	9 LAST 889	13,2553	02026 II		SETROX	
0230			13,2554	64446 00		RLS	
0231			13,2555	77650 II	ABVAL	SR2R	SCALE FROM B-27 TO B-29
0232	REF	3 LAST 1212	13,2556	26546 II	GOTO		
0233	REF	12 LAST 708	0051		SETROX	=	
0234			13,2557	00065 II	504RM	S2	
0234			13,2560	01265 II	2DEC	1738090 B-29	METERS B-29 (MOON RADIUS)